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1937

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## TAXONOMIC FERN-STUDIES III—V

BY

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- III. Revision of the Genera and Species of Ferns described  
by A. J. CAVANILLES.
- IV. Revision of the Bornean and New Guinean Ferns collected  
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With 6 Plates and two Figures in the Text.

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Nos. I—II of this series were published in this Arkiv Bd. 6, Nr. 3. 1929.



### III.

## Revision of the Genera and Species of Ferns described by A. J. CAVANILLES.

It is now generally acknowledged that every modern monographic work must be based principally on an examination of type-specimens, and it is always advisable first of all to state with certainty what the oldest described species are. Proceeding chronologically one will quickly find that a considerable number of species described later are identical with older ones, which either have been entirely forgotten or reduced to synonyms. The student must, however, always be sure that the supposed type-specimen at hand represents the actual type or at least a genuine cotype. Many so-called cotypes or authentic specimens are very often misleading and should be dealt with very cautiously. In my paper: *Ueber einige Farne in O. Swartz' Herbarium* (Ark. för Bot. 9, no. 11, 1910) I have pointed out some examples illustrating this and many others could be added. The worst of all are the so-called authentic specimens of type-numbers of new species distributed to many herbaria, e.g. those of Spruce's collections, because the same number very often was given to two, three or even more distinct species. This bad method of distribution is now fortunately rare, but even the most experienced collector can commit the error of mixing together specimens of closely allied species when sorting the material out into sets for distribution. It is also regrettable that some pteridologists of our own day have described scores of new species without knowing the types of related ones.

During more than thirty years I have done my best to avoid such errors by, as far as possible, basing my taxonomic studies on a close examination of the actual types. By the kindness of the authorities of most leading herbaria I have had the good fortune

to get access to the majority of the old species of ferns. Thus I have seen the types of LINNÆUS (London), THUNBERG (Uppsala), RETZIUS (Lund), SWARTZ (Stockholm), FORSSKÅL and M. VAHL (Copenhagen), WILLDENOW (Berlin), LAMARCK, POIRET and DESVAUX (Paris), LANGSDORFF and FISCHER (Leningrad) and of others, and finally of CAVANILLES (Madrid), whose ferns are dealt with in this paper.

Cavanilles described in the years 1799—1804 about a century of new fern-species, of which about 20 per cent. have remained unknown until the present day, and a similar number have been identified only with doubt. The right understanding of his species is very important nomenclaturally, because the greater part originate from tropical regions previously unexplored botanically, and it is *a priori* highly probable that many of his species have been described later under other names, against which those given by him have priority. The reasons for so many of his species being forgotten or remaining unknown are chiefly the following: 1) his incomplete descriptions, 2) he distributed very few duplicates to other herbaria, 3) the localities quoted by him are often incorrect, and 4) since the time of Lagasca a century ago no pteridologist seems to have seen the type-specimens.

During a stay at Stockholm in 1909 I found in Herb. Swartz some mostly very fragmentary specimens sent and named by Cavanilles<sup>1)</sup>, and I succeeded in identifying some of the unknown species. In April 1921 I spent a couple of days in Madrid, and I was, of course, very interested in seeing the ferns of Cavanilles, and by the kindness of the late Professor PRÓSPER I got permission to examine them.

Herbarium Cavanilles was a surprise to me. It was preserved as a separate collection in the Botanical Garden and seemed to be quite in the state as left by Cavanilles; the ferns at least have apparently never been examined since. Most of the specimens were excellent and complete and a number of species were represented by several leaves or individuals. The great bulk of the ferns were collected by LUIS NÉE during the "Malaspina" Expedition, and a certain number of them were described and published by Cavanilles, but his early death in 1804 stopped his work unfinished. His descriptions were published in his "Descripción de las Plantas"

<sup>1)</sup> See my paper: Von CAVANILLES beschriebene Arten. Arkiv för Bot. 9, no. 11, p. 37—43. 1910.



in 1802—03, but the species described there are but a small part of those contained in his herbarium. In the herbarium I found excellent specimens of numerous species from Luzon, Guam, etc. that have been described in the twentieth century, but unfortunately my short stay in Madrid compelled me to confine myself to examine the types of the described species only.

The "Malaspina" Expedition<sup>1)</sup> (1789—1794) proceeded from Spain to South America (Montevideo and Buenos Ayres), round Cape Horn and along the American Pacific coast to Sitka, Alaska, and thence southward to Acapulco in Mexico; from Acapulco across the Pacific Ocean via Marshall Isl. (Milne Isl.) and Guam, Mariannes, to Manila; from Manila to the southern part of New Zealand, thence to Sydney (Botany Bay) and via Tonga Isl. to Callao, Peru, and home to Spain round Cape Horn. Botanical specimens were collected in most places where stops were made by the botanists of the expedition, the Spaniard LUIS NÉE and the Austrian THADDEUS HAENKE, who collected over 10,000 specimens of plants, 4000 of which were considered new. Haenke's material is now in Prague, Vienna and other places and was partly worked out by C. B. PRESL and published in his work *Reliquiae Haenkeanae* 1825—30. It is often re-examined and as a whole is well-known. Née's collection is, as mentioned, in Madrid and hitherto has been little known.

Almost all the new ferns described by Cavanilles were gathered by Née, and the localities quoted by him correspond as a whole to the labels in his herbarium. It is evident, however, that several of these localities are false, American species being credited to the Philippines or Mariannes and vice versa, a bad circumstance already pointed out by MERRILL (l. c.). These false localities are in reality so numerous that all those quoted *a priori* must be considered untrustworthy. By examination of the type-specimens it is fortunately not difficult to state in most cases from which part of the globe they originate.

In 1921 my time did not permit me to study very closely all the fern types and not all were found. Notes and sketches made in Madrid together with a fair number of fragments presented to me by Prof. Prósper made it possible, however, to identify afterwards several species, and the greater part of this paper was worked

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<sup>1)</sup> See MERRILL: Phil. Journ. Sci. 10 C, p. 180 f. 1915.

out several years ago. Dr. WILLIAM R. MAXON helped me then with the identification of some species, for which aid my best thanks are due to him. Too many were still unseen, and I tried in vain to obtain them on loan. For the first time, in the spring of 1936 I succeeded in this by the very kind help of my friend, Mr. FRANCIS MACBRIDE of the Field Museum, Chicago, who worked at Madrid during the winter of 1935—36. I asked him to try to find the wanted type-specimens, and this he did, and found them partly in Herb. Cav., partly in the general herbarium and in another old collection, Herb. Rodriguez, in which more complete specimens were found than in Herb. Cav.; furthermore Mr. Macbride got the permission of the director of the museum to send me on loan the whole material of the species asked for by me. For this great aid I render my heartiest thanks to Mr. Macbride and the director of the Botanical Museum, Madrid.

I have thus now seen all but half a dozen of the types, and in the following pages I publish the results arrived at, enumerating the new species of Cavanilles (others are not considered) in the order followed by Cavanilles in the "Descripción", mentioning a few others described in other papers in connection with the genera to which they belong. The names printed in heavy type are those by which the species should now be known according to my Index Filicum with supplements. I do not cite many synonyms or references to literature but refer to my Index. Those species which have always been rightly understood are listed without comment, the hitherto unknown or critical ones are made clear by references to illustrations or by a new description.

The results of my studies may be summarized thus:

CAVANILLES described 6 genera and 101 species of ferns. Three genera, *Tectaria*, *Oleandra* and *Humata*, are now generally adopted. Of the species:

32 are valid and registered as such in Index Filicum 1905—06, mostly under other genera than described originally.

22 are rightly identified in Index.

25 are wrongly or doubtfully identified.

22 are registered as unknown.

Of the 47 wrongly identified or unknown species:

- 23 are now established as valid ones and all identified with species described later.
- 18 are reduced to synonyms of older species.
- 6 remain still as unknown or doubtful.

#### Works of CAVANILLES containing descriptions of Ferns:

1. Diez especies nuevas del género *Acrostichum*. — *Anales de Historia Natural* vol. 1 num. 2, mes de Diciembre de 1799, pag. 101—107.
2. Nuevos caracteres genéricos de los Helechos por SMITH. — *Ibid.* pag. 108—115. — (In this paper the first descriptions of *Tectaria* and *Oleandra*, p. 115).
3. De las plantas que el ciudadano AUGUSTO BROUSSONET colectó en las costas septentrionales de la Africa y en las Islas Canarias. — *Anales de Ciencias Naturales* vol. 4, pag. 52—190. 1801. (Ferns pag. 97—109).
4. Del género *Ugena*. — *Ibid.* pag. 249—? October 1801. (Not seen).
5. *Icones et Descriptiones Plantarum* etc. vol. 6. 1801. — (In this well-known work descriptions (p. 68—76) and illustrations (pl. 592—595) of species of *Osmunda* (= *Anemia*) and *Ugena* Cav.).
6. Descripción de las plantas que D. ANTONIO JOSEF CAVANILLES demostró en las lecciones públicas del año 1801, precedida de los principios elementales. Madrid 1802. 284 pages. (Continued:) Géneros y especies de plantas demostradas en las lecciones públicas del año de 1802. (Madrid 1803). Pag. 285—625.

The species demonstrated are numbered. The ferns (helechos) are described pag. 237—282 and have the numbers 567—700 in the lessons of 1801 (vol. 1), pag. 547—556 no. 1155—1167 in those of 1802 (vol. 2). — This important work was in older time usually cited as *Prælect(iones)* or *Dem(onstrationes)*.

7. Del *Macrocnemo* y de algunas plantas descubiertas por los Españoles. — *Anal. Cienc. Hist. Nat.* 7. 1804. — (In this only one fern, *Diplazium nitidum*, p. 66, pl. 48, as far as I can ascertain. I have not seen the paper.)

Some older authors refer to "Cav. Hort. Madrit.", a work never published. I have seen only one plate with a rather rough figure of *Trichomanes rhizophylla* Cav.

577. *Acrostichum bicolor* Cav. *Anal. Hist. Nat.* 1: 103. 1799, Descr. 238 partim = *Cyclophorus acrostichoides* (Forst.) Pr. — *A. bicolor* Cav. Descr. 238 partim = *Cyclophorus samarensis* (Pr.) C. Chr.

Type-locality quoted: Marianne Islands, but probably wrong. NÉE!  
The author described this twice but his descriptions are not identical,

evidently because he worked with mixed material. There are four covers with several specimens in Herb. Madrid but fortunately I can state with full certainty, what is the actual type described in 1799. One cover in Herb. Cav. contains three sterile leaves on a long rhizome, labelled in CAVANILLES' handwriting: "*Acrostichum bicolor*, anaes fasc. 2, ex insulis Marianis sobre los arboles. NÉE." This specimen matches excellently the first description and is typical *C. acrostichoides*, of which *A. bicolor* is thus a synonym. The cover contains further a fertile frond labelled: ex Guaranda in Quito, which is typical *C. samarensis*, but it does not fit the description. The other three covers contain a rich material with numerous sterile and two fertile leaves of *C. samarensis* besides a poorly fertile specimen of *C. acrostichoides*; in one cover with *C. samarensis* is a label: *Acrostichum bicolor*, Praelectiones no. 577; the other labels are not written by CAVANILLES? The locality: Guaranda is of course wrong and it is probable that the whole material was collected in Luzon. Prof. MERRILL wrote to me some years ago that *A. bicolor* must be *C. adnascens*, the only species of the genus found in Guam, but that species is not in the *bicolor*-covers.

578. *Acrostichum linguaeforme* Cav. Anal. Hist. Nat. 1: 103. 1799, Descr. 238 = *Elaphoglossum linguaeforme* (Cav.) Moore, Ind. 11. 1857. Syn. *Acrostichum ciliatum* Pr. Rel. Haenk. 1: 15. 1825, *Elaphoglossum ciliatum* Moore 1857, C. CHR. Index 304 cum syn. *Acrostichum Preslianum* Fée, Acrost. 46 t. 24 f. 1? *Elaphoglossum Preslianum* Christ, Mon. Elaph. 95. 1899 (partim?), C. CHR. Index 313 (excl. syn. *A. praelongum* Fée).

Type-localities: La montaña de San Antonio, reyno de Quito, y junto al Obragillo en el Peru. NÉE!

The smaller of two leaves received from Prof. PRÓSPER agrees perfectly both with the original description and with PRESL's of *A. ciliatum*, which inappropriate (and also invalid) name was changed by FÉE to *A. Preslianum*. Further it is absolutely identical with SPRUCE no. 5230, which HOOKER (sp. 5: 221) quoted under *A. Preslianum* and no doubt rightly. It may, therefore, hardly be doubted that my identification of the quite forgotten species of CAVANILLES is right. — The rhizome is wide-creeping, the blade oblanceolate,  $25 \times 2$  cm., acute, attenuated downwards, firm but not coriaceous, the midrib below with scattered small ovate, reddish-brown, entire scales, and similar but smaller ones are found along the margins (nearly all abraded), the veins distinct, terminating within the scarcely thickened margins.

The other leaf received belongs no doubt to another species, but not agreeing with the description it is without interest.

In South-East Brazil and Paraguay a closely related species occurs, *A. praelongum* Fée, which by most authors is called *E. Preslianum*. It differs from the andine species by much shorter and thicker rhizomes, the leaves thinner without scales. It should be named *Elaphoglossum praelongum* (Fée) C. Chr. comb. nov.

579. *Acrostichum plicatum* Cav. Anal. Hist. Nat. 1: 104. 1799, Descr. 238  
= *Elaphoglossum plicatum* (Cav.) C. Chr. Index cum syn. —  
Plate II, fig. 1—3.

Type-locality: Obragillo, Peru. NÉE!

*A. lepidotum* Willd. was evidently described from a portion of the type-collection of *A. plicatum* (Herb. Willd. no. 19519!). The species is well described by CHRIST (Mon. Elaph. 77, as *E. lepidotum*). In vestiture it is not unlike *E. muscosum* but well marked by the long-creeping rhizome clothed with black-brown entire scales, the up to 20 cm long stipe and the blade  $20 \times 1.5$  cm. Some of the fertile fronds of the type are conduplicate, hence the name.

580. *Acrostichum squamosum* Cav. Anal. Hist. Nat. 1: 104, 1799, Descr. 239 = *A. squamatum* Sw. Syn. 11. 1806 = *Elaphoglossum squamatum* (Sw.) Moore 15. 1857. Syn. *E. Lindenii* (Bory) Moore, C. Chr. Index cum syn. — Plate I, fig. 1—3.

Type-locality: Obragillo, Peru. NÉE!

It was surprising to find that the forgotten *A. squamosum* Cav. is identical with the well-known andine *E. Lindenii*. Because of *E. squamosum* (Sw.) J. Sm. the original name is unfortunately invalid in the genus and one is compelled to use SWARTZ' name. In 1801 he rebaptized his own species *A. hirtum* of 1788 to *A. squamosum*, reasonably enough, but he was in 1806 wrong in retaining this name and in changing the name of *A. squamosum* Cav. to *A. squamatum*.

- Acrostichum fimbriatum* Cav. Anal. Hist. Nat. 1: 102. 1799, (not in Descr. 1802).

Type-locality: San Antonio, Ecuador. NÉE!

A species of the *Elaphoglossum scolopendrifolium*-complex, but the description and a fragment of the type do not enable me to identify it with any later described species of that group, which needs a thorough revision. It should be compared with *E. hystrix* (Kze.) Moore, *E. barbatum* (Karst.) Hieron. It falls certainly under *A. hybridum* Sodiro, Cr. v. quit. 438.

581. *Acrostichum reptans* Cav. Anal. Hist. Nat. 1: 104. 1799, Descr. 239 = *Elaphoglossum reptans* (Cav.) Moore, C. Chr. Index 314 = *Polypodium ciliatum* Willd. 1810, C. Chr. Index 517.

Type-locality: Guayaquil, Ecuador. NÉE!

A small but as a whole typical form of *P. ciliatum*, the sterile leaves about  $2 \times 1$  cm. CAVANILLES said: "ocho a doce pulgadas de largo", I suppose that "pulgadas" should be "lineas". The specific epithet *reptans* is invalidated in *Polypodium* by *P. reptans* Gmel. 1791.

582. *Acrostichum axillare* Cav. Anal. Hist. Nat. 1: 101. 1799, Descr. 238 = *Leptochillus axillaris* (Cav.) Klf., C. Chr. Index 384.

Type-locality: Luzon. NÉE!



585. *Acrostichum viviparum* Cav. Descr. 240. 1802 (non L. fil. 1781) = ***Onychium siliculosum*** (Desv.) C. CHR. Index and Suppl. III. 133. 1934.

Type-locality: Puerto de Sorzogón, Luzon. NÉE!

587. *Acrostichum bifurcatum* Cav. Anal. Hist. Nat. 1: 105.. 1799, Descr. 241 = ***Platyserium bifurcatum*** (Cav.) C. CHR. Index 496.

Type-locality: Port Jackson, N. S. Wales. NÉE!

589. *Acrostichum lineatum* Cav. Anal. Hist. Nat. 1: 106. 1799, Descr. 241 = *Lomaria crenata* Pr. Rel. Hænk. 1: 51 = ***Blechnum spicant*** (L.) With (var.?).

Type-locality: Nootka Isl. (Vancouver). NÉE!

If the Pacific form of the species is somewhat different from the European type, CAVANILLES' name for it should not be forgotten.

591. *Acrostichum tartareum* Cav. Descr. 242. 1802 = ***Pityrogramma tartarea*** (Cav.) Maxon, C. CHR. Index Suppl. III. 140.

Type-locality: Near Guamantanga, Peru. NÉE!

592. *Acrostichum caudatum* Cav. Descr. 242. 1802 = ***Pityrogramma caudata*** (Cav.) C. CHR. comb. nov. — Syn. *Gymnogramme Hookeri* J. Sm., BAK. 1868, C. CHR. Index 337, *Pityrogramma adiantoides* (Karst.) Domin 1928, C. Chr. Index Suppl. III. 138 (pro parte?). — Plate II, fig. 4—5.

Type from Panamá. NÉE!

Following some now forgotten source this was doubtfully identified with *Leptochilus alienus* in Index, very wrongly indeed. It is certainly *G. Hookeri* J. Sm., a little more divided than usually seen, being subtripinnate below, but the ferrugineous pubescence of the under side (believed by CAVANILLES to be the "fructification") and the broadly revolute margins (believed to be "tegumentos", i.e. indusia) show clearly that it is the same species. The lamina of the only leaf in Herb. Cav. is 25 × 20 cm, deltoid, the lower pinnæ subdeltoid with the lower pinnules incised nearly to the costule with 3—4 pairs of oblong or triangular lobes and terminating into a long entire apex like the upper pinnules, the upper pinnæ entire or auriculate or hastate (biauriculate), united by a wing to the costa. — HIERONYMUS supposed *G. Hookeri* to be identical with or a form of *Pit. adiantoides* (Hedwigia 48: 221) and he is probably right. His var. *peruviana* agrees, judging from his description, very closely with CAVANILLES' type.

- Acrostichum subcordatum* Cav. Anal. Cienc. 4: 97. 1801 = ***Notholaena marantae*** (L.) R. Br.

Type from Tenerife. BROUSSONET!

594. *Polypodium percussum* Cav. Descr. 243. 1802.

Type-locality: Peru. NÉE!

The author quoted the Mariannes as the home of this species, probably due to a confounding of labels.

595. *Polypodium rostratum* Cav. Descr. 244. 1802 = *P. percussum* Cav.

Type-locality: Ecuador, en la montaña de San Antonio. NÉE!

This is a large form of the preceding species with a long rostrate apex.

597. *Polypodium peltatum* Cav. Descr. 244. 1802; C. CHR. Index Suppl. III. 155. 1934. — *P. polylepis* Roemer; KUNZE 1839, C. CHR. Index 555.

Type-locality: Ecuador, Quito. NÉE!

Here again the author confounded the localities, ascribing this species to the Mariannes. In Herb. Cav. are to be found within the same cover quite uniform specimens, some of which are said to be collected in Quito, others in the Mariannes, but they originate certainly all from Ecuador. All are exactly identical with the very distinct andine species *P. polylepis* Roemer (cf. WEATHERBY: Contr. Gray Herb. n. s. LXV: 9. 1922). CAVANILLES' species-name is, however, fully available within the genus and must replace *polylepis*.

598. *Polypodium levigatum* Cav. Descr. 244. 1802; C. CHR. Ark. för Bot. 9 no. 11. 41 f. 13. 1910, Index Suppl. I. 125 (not of authors and Ind. 537). — *Goniophlebium semipinnatifidum* Fée, Gen. 256. 1852. — *Polypodium semipinnatifidum* Mett. Pol. 80. 1857, Hieron. Hedwigia 48: 262. 1909. — *P. glaucophyllum* part. Sodiro, Cr. vasc. quit. 346, Sert. Fl. Ecuad. II. 28. 1908.

Type-locality: Sobre peñas de la montaña de San Antonio in Quito. NÉE! (Several complete specimens).

As shown by me (1910) this is a true *Goniophlebium* and not at all identical with *P. (Campyloneurum) lapathifolium* Poir. as believed by most writers. It is evidently a common fern in the northern Andes. SODIRO described in his Sertulæ II several varieties of *P. glaucophyllum*, of which his var.  $\alpha$  and  $\beta$  closely correspond to the type of *P. levigatum* Cav. The fronds are normally entire, the original *G. subpinnatifidum* being a casual, subpinnatifid form; nearly all specimens referred to *P. semipinnatifidum* by METTENIUS and HIERONYMUS are said to have entire leaves and must be considered as typical *levigatum*. — Whether *P. glaucophyllum* Kze. from the West-Indies should be regarded as a distinct species or a variety of *P. levigatum* is a matter of convenience. In general habit, size, rhizome, etc. it resembles closely *P. levigatum*, but it is decidedly glauco-pruinose beneath, while *levigatum* is green on both surfaces.

599. *Polypodium longifolium* Cav. Descr. 245. 1802 = *Cyclophorus longifolius* (Cav.) C. CHR. comb. nov. — *Polypodium americanum* Hook. sp. 5: 54. 1863. — *Cyclophorus americanus* C. Chr. Index 198, cum syn.

Type-locality: Ecuador, las haciendas del destruido Pelileo, enfrente del Tunguragua. NÉE! (complete specimens).

This most remarkable fern must now bear CAVANILLES' old name. It is a wonder that his description has been overlooked for more than one century, as it clearly agrees very well with *P. americanum* Hook. and with no other andine species.

601. *Polypodium enerve* Cav. Descr. 245. 1802; C. CHR. Index Suppl. III. 148. 1934 (with syn.?). *P. evenium* Spr. 1827. — Plate I. fig. 4.

Type-locality: Marianne Islands. NÉE!

A single plant with one sterile and one fertile leaf is found in Herb. Cav. It belongs to a group of Malayan species of the section *Pleuridium* (J. Sm.) with dimorphic entire leaves. It resembles very closely some forms of the variable *P. rupestre* Bl. and as a matter of fact I have some forms of this which I cannot distinguish from *P. enerve*. Therefore I have united all these forms into one species, *P. enerve*, Index Suppl. III, but perhaps daringly, wherefore I give here a figure and description of the type.

Rhizomate tenue, repente, paleis lanceolatis, parvis, luteis vestito. Frondis sterilis stipite 3 cm longo, lamina ovata, 4 cm longa, 2 cm lata, fertilis stipite 7 cm longo, lamina 9 cm longa, medio 17 mm lata, lanceolata, acuminata. Soris 3—4-seriatis, minimis, superficialibus, sporangiis longe pedicellatis, paraphysibus nullis. Frondibus omnino glabris, coriaceis, venis invisibilibus.

It is not improbable that this fern was collected in Luzon.

602. *Polypodium polycarpon* Cav. Descr. 246. 1802. — Syn. *P. punctatum* (L.) Sw. 1801, Index (non Thbg. 1784) as usually interpreted.

Type-locality: Probably Luzon or Marianne Islands, though the author believed it to be San Antonio in Ecuador. NÉE!

604. *Polypodium trilobum* Cav. Descr. 246. 1802 (non HOUTT. 1783) = *P. Feuillei* Bertero 1829, C. CHR. Index Suppl. III. 149. 1934. — *P. synammia* (Fée) C. Chr. Ind. 569, cum syn.

Type-locality: Talcahuano, Chile, 1. NÉE!

606. *Polypodium pseudoaureum* Cav. Descr. 247. 1802 = *P. aureum* L. subsp. *pseudoaureum* (Cav.) C. Chr. comb. nov. — *P. areolatum* Willd. 1810; *P. aureum* subsp. *P. areolatum* C. Chr. Ind. 511, cum syn.

Type-locality not indicated, 1. NÉE! (A single leaf).

Several authors consider *P. areolatum* a distinct species; if so it must be now called *P. pseudoaureum* Cav.

609. *Polypodium hemionitis* Cav. Descr. 248. 1802, C. CHR. Ark. för Bot. 9 no. 11. 40. 1910 = *P. scolopendria* Burm. (*P. phymatodes* L.).

Type-locality: Marianne Islands, 1. NÉE!

After an examination of authentic fragments in Herb. Swartz I con-



sidered (1910) this a distinct species allied to *P. incurvatum* Bl. Having now seen the rather rich material in Herb. Cav. I am compelled to withdraw this conclusion and refer it to *P. scolopendria*. The material consists of several leaves from different localities, a larger fertile frond from Puerto Humata with 6 pairs of segments separated by broad open sinuses about as in *P. Powellii*, and immersed sori in two imperfect series, another similar from Babao Island, and four 2- or 3-lobed sterile ones from "los Amigos", similar to that in Herb. Swartz described by me 1910 and differing from the larger fronds, which no doubt belong to *P. scolopendria*, in the more coriaceous texture and bluntly obtuse segments. It is probable, however, that all belong to one species; the sterile fronds of *P. scolopendria* are extremely varied in size and division, and in the Malayan region such trilobed fronds are often met with, though normally with acute segments. The species is, I think, an aggregate comprising many geographical races.

610. *Polypodium cinereum* Cav. Descr. 248. 1802 = *Lophosoria quadripinnata* (Gmel.) C. CHR. in Skottsberg, Nat. Hist. Juan Fernandez 2. 16. 1920: *Alsophila quadripinnata* (Gmel.) C. Chr. Index 47 cum syn.

Type-locality: Chiloe. NÉE!

The common Chilean form of this well-known species; further studies may show if it is sufficiently different from other forms as to be regarded as a variety *cinerea*.

### *Tectaria* CAVANILLES.

"Fructificacion en puntos redondos, esparcidos, situados en la superficie posterior de la hoja. Tegumento umbilicado. Abertura casi circular. Exemplo de este género: *Polypodium trifoliatum* de Linneo." — (CAVANILLES: Anales de Historia Natural, mes de Diciembre de 1799. Num. 2. Madrid 1799, p. 115).

The oldest description of *Tectaria* is here reprinted in order to state definitely that the genus was typified originally by *Polypodium trifoliatum* L., to which the description evidently applies. This statement seems to be necessary since T. NAKAI recently (Bot. Mag. Tokyo 47: 152. 1933), having not seen the original publication, believes that *Tectaria* Cav. is heterogenous including species of *Aspidium*, *Dryopteris*, *Polystichum*, *Nephrolepis* and *Athyrium*. It is true that CAVANILLES himself in a later publication (Anal. Cienc. Nat. 4: 99. 1801) to the generic diagnosis added an Obs. "Se distingue del Polipodio, como dixe en la pág. 115 del primer tomo de estos Anales, por el tegumento. A este género pertenecen el *Polypodium crenatum* de Swartz, los Polypodios *Filix mas*, *trifoliatum* de Linneo &c.", and he referred here with descriptions *T. Filix Femina* and two new species from Tenerife mentioned below. In "Descripcion" he added further to the genus a dozen, mostly new species, which are identified below.

This proves that CAVANILLES segregated all indusiate species from *Polypodium* L. under the name *Tectaria*, and this genus is as far quite identical with *Polystichum* Roth 1799, *Aspidium* Sw. 1801 and *Nephrodium* Richard

1801 but this his later treatment is of no nomenclatural value. The type-species of *Tectaria* is *Polypodium trifoliatum*, and any generic group including this species must be called *Tectaria*, and it can hardly be criticised that the name is taken up in my Index Suppl. III, replacing *Aspidium* of Index 1905.

*Tectaria caudata* Cav. Anal. Cienc. Nat. 4: 100. 1801 = *Athyrium filix femina* (L.) Roth var. *axillare* (Ait.) Webb et Berth.

Type from Tenerife. BROUSSONET!

Previously identified with *Athyrium umbrosum* (Ait.). Pr.

*Tectaria elongata* Cav. Anal. Cienc. Nat. 4: 101. 1801 = *Polystichum setiferum* (Forssk.) Moore ex Woynar (*P. aculeatum* subsp. *angulare* auctt.).

Type from Tenerife. BROUSSONET!

Previously identified with *Polypodium elongatum* Ait. = *Dryopteris filix mas* subsp. *elongata* (Ait.), probably because the species-name is the same, but a glance on the description will show at once that the species of CAVANILLES is a *Polystichum*.

In my Index Suppl. II: 29 the combination *Polystichum setiferum* (Forssk.) is ascribed to ROSENDAHL 1916, but Dr. BECHERER informs me that it was made earlier, illegally by MOORE 1859 and legally by WOYNAR 1913.

He writes (February 20th, 1935): "In MOORE: Nat. Pr. Brit. Ferns etc. ed. 1 p. 134, 1859, figuriert der Name *Polystichum setiferum* Moore Ferns of Gt. Brit. Nature Printed, t. 12, in Obs. an 3. Stelle in der langen Synonymie unter *Polyst. angulare*.

Die Kombination *Polyst. setiferum* (Forssk.) Moore ist daher tatsächlich gebildet u. publiziert worden. Dass sie MOORE nicht vorangestellt hat, ist bedauerlich. Da nach Art. 40 der Nomenklatur-Regeln (1935) in der Synonymie angeführte Namen ungültig sind, wird man nicht MOORE allein zitieren können, sondern folgendermassen zitieren müssen:

*P. setiferum* (Forssk.) Moore ex Woynar in Mitt. Naturw. Ver. Steiermark 49 (1912) p. 181. 1913.

613. *Tectaria incisa* Cav. Descr. 249. 1802; *Aspidium incisum* Sw. Syn. 47. — Syn. *Aspidium martinicense* Spr. 1804, Index.

Type from Puerto Rico, received from Ventenat!

A very common West-Indian form of the well-known *A. martinicense* and until now much misunderstood. It has of course nothing to do with *Dryopteris serra*, to which I referred it in Index, following some now forgotten source, probably KUHN.

614. *Tectaria crenata* Cav. Descr. 250. 1802; COPELAND, Phil. Journ. Sci. 2. Bot. 414; C. CHR. Index Suppl. III. 178. — *Aspidium tectaria* Desv. Prod. 245. 1827; *A. macrophyllum* Bl. Enum. 144. 1828 (non Sw.); *Sagenia platyphylla* J. Sm. Journ. Bot. 3: 410. 1841; *Aspidium platyphyllum* Pr. Epim. 65. 1849 (non Willd.); *A. pachy-*

*phyllum* Kunze, Bot. Zeit. 1848: 259, METT. Fil. Lips. 95 t. 21, C. CHR. Ind. 86 cum syn.; *A. fissum* Kunze, l. c. 258 (at least cultivated specimens distributed from the Leipzig Garden under that name); *A. persoriferum* Cop. in Perkins Fragmenta 177. 1905.—*A. repandum* Willd. sp. 5: 216. 1810; C. CHR. Index 90 cum syn.

Type-locality: Marianne Islands. NÉE! (Fertile and sterile leaves).

It is beyond doubt that *T. crenata* Cav. is identical with *A. pachyphyllum* Kze. as rightly pointed out by COPELAND, and he is probably right in also referring *A. repandum* Willd. here. While *A. pachyphyllum* in Hook. & BAK. Syn. Fil. is placed in *Nephrodium* subg. *Sagenia* (reniform indusia) *A. repandum* is retained in *Aspidium* (peltate indusia), but other authors unite them.

The genuine *T. crenata* is sub-dimorphous with the fertile leaves somewhat contracted, thus probably being identical with *A. persoriferum* Cop. The sterile leaves have 2—4 pairs of lateral, opposite pinnae, 30 × 7 cm, the margins slightly undulate-crenate, the base rotundate or very shortly cuneate, closely resembling the sterile leaf figured by METTENIUS in Fil. Lips.; the basal pair bear a large basiscopic lobe. Fertile leaf with 3—4 pairs of lateral pinnae below the trilobate, decurrent terminal pinna; they are about 25 × 5 cm, irregularly crenate, the sori very numerous in two rows between the main-veins, distinctly marked on the upperside; the indusia are corrugated, apparently peltate.

615. *Tectaria falcata* Cav. Descr. 250. 1802 = *Nephrolepis falcata* (Cav.) C. Chr. comb. nov. — Syn. *N. barbata* Copeland 1905. — Plate I, fig. 5—9.

Type-locality: Luzon, Sorzogon. NÉE!

A very characteristic species with very numerous rather small (6 × 1 cm) pinnae, which are falcate and acuminate with serrated apex, the lower ones dwindling, the rachis rather densely clothed with dark-brown small linear-subulate scales. It is evidently a species of a wide area in the Eastern Malayan region, known now from the Philippines, Borneo, Malay Peninsula and French Indochina. It is probably *N. exaltata* of most authors, but quite different from the American *N. exaltata*. The pinnae are not glabrous (i. e. naked) as described by COPELAND, even not in the type of *N. barbata* (Herb. Copeland), but more or less thinly paleaceous.

616. *Tectaria fraxinea* Cav. Descr. 250. 1802 = *Nephrolepis biserrata* (Sw.) Schott, sens. lat.

Type-locality: Obrajillo, Peru. NÉE!

This is the commonest American form of the pantropic(?) *N. biserrata* and an older name than *Aspidium punctulatum* Sw., which should be remembered if a critical revision of this difficult group should result in its segregation from the genuine *N. biserrata* from Mauritius.

The pinnae of *T. fraxinea* are up to 15 cm long, the lower sterile ones 18 mm wide and distantly and very faintly crenate, the upper fertile ones 12 mm wide, and distinctly crenate or subserrate towards the apex, the

crenations entire; rachis and costæ beneath woolly furfuraceous with pale to whitish much dilacerated and fimbriated scales. Sori about 2 mm from the edge, with persistent orbicular indusia.

617. *Tectaria serrata* Cav. Descr. 251. 1802 = *Nephrodium serratum* Pr. Rel. Hænk. 1: 34. 1825 = *N. Hænkeanum* Pr. Epim. 46. 1849 = *Dryopteris Hænkeana* (Pr.) O. Ktze., C. Chr. Index Suppl. III. 87. — Plate I, fig. 10—11.

Type-locality: Humata, Marianne Isl. NÉE!

This is in every detail identical with *N. Hænkeanum* Pr. (t. sp. in Herb. Presl), collected by HÆNKE at the same locality. PRESL knew only the upper portion of a leaf, but in Herb. Cav. the base is present showing below the lowest pair of hardly reduced pinnæ a pair of glandlike abortive pinnæ. *D. Hænkeana* (the older name *serrata* is invalid in the genus) is a critical species, being probably a form of *D. unita* (L.) O.K. (*Aspidium cucullatum* Bl.). The leaf of that species is narrowed more or less gradually through a number of dwindling and abortive pinnæ, while only a single pair is found in *D. Hænkeana*, but this is apparently the only difference and it is scarcely of specific value. Most writers applied the name *Hænkeana* to another similar but quite distinct species, *D. multilineata* (Pr.) C. Chr. Index Suppl. III. 92.

620. *Tectaria ferruginea* Cav. Descr. 252. 1802 = *Polystichum adiantiforme* (Forst.) J. Sm.

Type-locality: Montevideo. NÉE!

621. *Tectaria calahuala* Cav. Descr. 252. 1802 = *Polystichum adiantiforme* (Forst.) J. Sm.

Type-locality: Buenos Ayres. NÉE!

No. 620 is a small, compact, very coriaceous and no. 621 a more normal form of this wide-spread species, both common in the La Plata countries. *P. adiantiforme* is probably an aggregate, and CAVANILLES' two names should not be forgotten, if the S. American forms should appear to be different from the Polynesian type.

622. *Tectaria cinnamomea* Cav. Descr. 252. 1802 = *Dryopteris cinnamomea* (Cav.) C. Chr. 1911, Mon. *Dryopteris* I. 69 with synonymy.

Type-locality: Chalma, Mexico. NÉE. (Fragment in Herb. Sw.!).

### *Oleandra* CAVANILLES.

Anal. Hist. Nat. 1: 115. 1799, Descr. 252. 1802.

"Fructificacion en puntos reniformes, distintos, formando lineas paralelas al nervio principal de la hoja. Tegumento superficial, reniforme. Abertura vertical. Exemplo de este género: *Oleandra neriformis*."

In this short original diagnosis from 1799 the genus is sufficiently characterised, but the species *neriformis* was first described in 1802.

623. *Oleandra neriformis* Cav. Descr. 253. 1802. — Plate III, fig. 1—4.

Type-locality: Mauban, Luzon. NÉE!

This species is by some authors, especially HOOKER and BAKER, taken in a very wide sense, including forms from almost all tropical countries, while others have described several of these forms as distinct species. It is, therefore, important to state definitely, to which of the many forms the name *neriformis*, or better *neriiformis*<sup>1)</sup>, was applied originally.

In Index Fil. Suppl. III. 132. 1934 I identified it with *O. colubrina* (Blanco) Cop., which I regret very much now, since the actual type in Herb. Cav. is not that species. My former identification was based on a sheet in Herb. Swartz with the label: *Oleandra neriformis* in CAVANILLES' handwriting. This is the only sheet of *Oleandra* in Herb. Sw. and contains at least two forms, one of which must be *O. neriiformis* and the other I supposed to be a portion of *Aspidium pistillare* Sw. The type of this, collected in Java by THUNBERG, is in the Botanical Museum, Uppsala, and an examination of it proved that my conclusion was right, but unfortunately I was wrong in my interpretation of the two forms in Herb. Swartz.

I give here a full description of the genuine *O. neriiformis*, which will be useful for an eventual monograph of the genus.

Stem stiff and straight, covered with firmly imbricated scales; these are peltate, elliptical, 1—1.5 mm broad at base, blackish and thick with thinner light-brown edges and base and with a straw-coloured, subappressed finely acuminate apex, which is easily broken off and in young scales woolly ciliate. Leaves scattered on the stem or the upper ones approximate or in whorls(?). Phyllopodia about 1 mm, the stipe about 1 cm long, the blade lanceolate or suboblanceolate, up to 39 cm long by 3.5 cm wide — the fertile one narrower, 2 cm — cuneate below and rather abruptly narrowed above into a caudate-subulate apex, thinly papyraceous, above glabrous with a deeply furrowed midrib, this prominent below with several small light-brown, lanceolate-linear, acuminate and subentire scales, the veins beneath with several slender and soft, brown hairs. Veins very close, 20—22 per centimetre along the margin, forming an angle of 55° with the midrib, mostly forked from the base with the branches often forked again. Sori in two rather straight rows about 1 mm. from the midrib, indusia about 1 mm long, blackish-brown and with lighter margins and a broad open sinus.

It is probable that most Polynesian and Malayan specimens referred to *O. neriiformis* were rightly named but also that the species is a variable one, especially with regards to the length of phyllopodia and stipe and to pubescence. *Aspidium pistillare* may be one of these forms, intermediate between *O. neriiformis* and *O. colubrina*. The phyllopodia are 2—3 mm long, the stipe scarcely 1 mm, the veins not so close and more horizontal, glabrous, the sori about 2 mm from the midrib in two wavy lines. This form is probably the commonest in Western Malaya and if the differences noted are sufficient for its segregation my combination *O. pistillare* (Sw.) C. Chr. Index Suppl. III. 132 must be the proper name for it.

<sup>1)</sup> This more correct spelling was first used by SWARTZ, Syn. Fil. 42. 1806.



One thing more must be considered by an eventual monographer. If *A. pistillare* is to be regarded as a form of *O. neriiformis* it must be remembered that it was published 1801, one year before the description of the species *O. neriiformis*. May the original description of the genus *Oleandra* from 1799 be said to be also a legal description of the species? I do not think so.

627. *Asplenium subsessile* Cav. Descr. 254. 1802 = *A. serratum* L.

The type-locality quoted: Palapa, Mariannes, is no doubt false. NÉE!

Probably from the Andes, differing a little from the West-Indian type in the slender keeled midrib, which is furnished with some ovate, black-brown scales, and in the nearly entire blade, which is very faintly crenate upwards, otherwise very typical.

628. *Asplenium vittæforme* Cav. Descr. 255. 1802 (not of later writers).  
— Plate III, fig. 6.

Type-locality: Mauban, Luzon. NÉE!

Most authors have identified this with *A. sundense* Bl. but wrongly. The type-specimen in Herb. Cav. consists of three leaves without rhizome and all with the stipe and tips broken off; the stipe is said by CAVANILLES to be 1—2 inches long. The lamina is linear-oblong or broadest at or above the middle, ca. 40 cm long by 3.5—4 cm wide, very gradually narrowed downwards, entire, pale-green below, chartaceous, the midrib nearly plane and furnished, especially in the lower part, with some small lanceolate, black-brown, sparsely fimbriate scales above, and beneath with more numerous and a little larger scales, the upper surface otherwise glabrous, the under one paleaceous with similar, appressed smaller, finely acuminate scales, which are scattered over the whole surface. Veins not very distinct, mostly once forked, at angles of about 60° to the midrib. Sori beginning near the midrib and terminating 5—6 mm from the margin, the indusia whitish-brown, straight and entire.

The description here given fits perfectly my Bornean specimens of *A. squamulatum* Bl. and my only reason for not identifying this with *A. vittæforme* is the lack of rhizome; it is by CAVANILLES described as "fibrosas, negruzcas y ramosas". I have, however, little doubt of their identity. *A. sundense* Bl. is very different by its wide-creeping rhizome, grass-green and naked fronds with nearly horizontal sori.

629. *Asplenium trilobum* Cav. Descr. 255. 1802.

Localities quoted: San Carlos de Chiloe, Talcahuano and Marianne Isl., the latter certainly false. NÉE. (Not seen).

A well-known Chilean species.

632. *Asplenium caudatum* Cav. Descr. 256. 1802 (not FORST. 1786) =  
*A. elongatum* Sw. Syn. 79. 1806, METT. Aspl. no. 63 (not SALISB. 1796) = *A. productum* Pr. Rel. Hænk. 1: 42 t. 8 f. 1. 1825 =  
*A. tenerum* Forst. var. *productum* (Pr.).

Type-locality: Palapa, Guam. NÉE!

Before SWARTZ changed the invalid name *caudatum* Cavanilles himself published a new(?) species:

*Diplazium nitidum* Cav. Anal. Cienc. Nat. 7: 66 t. 48. 1804. Type from Palapa. (Not seen). Prof. MERRILL kindly informs me that the figure is an excellent representation of *Asplenium tenerum* Forst. I guess that it is the same and perhaps only a new name for *A. caudatum* Cav.

633. *Asplenium aureum* Cav. Anal. Cienc. Nat. 4: 104. 1801, Descr. 256 = *Ceterach aureum* (Cav.) L. v. Buch.

Type from Tenerife. BROUSSONET. Not seen, but no doubt always rightly recognised.

636. *Asplenium flavelifolium* Cav. Descr. 257. 1802 (improved by SWARTZ to *flabellifolium*).

Type-locality: Botany Bay, N. S. Wales. NÉE. Not seen but certainly rightly recognised by all botanists.

640. *Asplenium macrophyllum* Cav. Descr. 259. 1802 (not Sw. 1801) = *A. grande* Sw. Syn. 77. 1806 = *Diplazium marginatum* (L.) Diels.

Locality quoted: Palapa, Guam, NÉE!, but it is certainly false. The type-specimen is a common form of the American *D. marginatum* and probably collected in the Andes.

*Asplenium serrulatum* Cav. Anal. Cienc. Nat. 4: 105. 1801.

Type from Mogador, Morocco. Not seen. Usually identified with *A. adiantum nigrum* L. and probably identical with the subspecies *A. onopteris* L.

641. *Darea tripinnata* Cav. Descr. 259. 1802.

Locality not stated and type not seen. CAVANILLES received the specimen from J. E. SMITH under the name *Cænopteris rhizophylla* but he considered it distinct from that species as figured by SMITH himself (Icon. t. 50). It is probably a form of *Asplenium myriophyllum* (Sw.) Pr.

642. *Hemionitis rigida* Cav. Descr. 260. 1802 = *Antrophyum reticulatum* (Forst.) Klf.

Type-locality: Mauban, Luzon. NÉE!

The type-specimen consists of a single leaf without rhizome. It resembles FORSTER's type of *A. reticulatum* more than any other specimen from Tropical Asia seen by me. The broadly spatulate frond is 25 × 8 cm, without distinct costa, the apex lacerately incised, evidently insect-bitten, a feature not seldom met with in *A. semicostatum*; the densely reticulated sori are immersed and narrow with filiform paraphyses.

643. *Hemionitis plantaginea* Cav. Descr. 260. 1802 = *Antrophyum plantagineum* (Cav.) Klf.

Type-locality: Mauban, Luzon. NÉE!

The type of this was excellently illustrated by BORY DE SAINT-VINCENT in DUPEYREY: Voy. Coquille pl. 28A. By its lanceolate leaves it differs from *A. Lessonii* Bory, l. c. pl. 28B, which often is referred to *A. plantagineum* as a variety with the synonym *A. angustatum* Brack. I should regard *A. Lessonii* as a distinct species and *A. angustatum* as a variety of *A. plantagineum* with longer and narrower fronds.

644. *Hemionitis sessilifolia* Cav. Descr. 261. 1802 = *Antrophyum sessilifolium* (Cav.) Spr. Syst. 4: 67. 1827. — Syn. *A. Cumingii* Fée 1852 (and *A. Grevillei* Balf. 1848, Index?).

Type from Luzon, Mauban. NÉE!

The type-specimen is sparsely soriferous, still it is possible to see the filiform paraphyses and thus its identity with *A. Cumingii* Fée is sure. FÉE's plate, Hist. Anthroph. pl. 4 f. 7 illustrates it excellently. The smaller leaves of COPELAND: Pteridophyta Phil. exsicc. no. 29, distributed as *A. reticulatum* match perfectly the type, the largest fronds of which are  $22 \times 2$  cm.

645. *Hemionitis elongata* Cav. Descr. 261. 1802 = *Antrophyum lanceolatum* (L.) Klf.

Type from Puerto Rico, received from Ventenat. Not seen, but identification certainly right.

647. *Blechnum auriculatum* Cav. Descr. 262. 1802.

Type-locality: Mt. Peña-blanca, Pampas of Buenos-Ayres. NÉE. The other locality quoted, Panamá, is no doubt false.

Type not seen, but the description fits very well the common species from temperate South America known as *B. auriculatum*.

649. *Blechnum caudatum* Cav. Descr. 262. 1802 = *B. occidentale* L.

Type-locality: Chimborazo. NÉE!

A common form of *B. occidentale*, hardly worthy of the rank of a variety (var. *caudata* Hook. sp. 3: 51). The basal pinnæ are considerably shortened, and *B. caudatum* Pr. Epim. 106 is, according to his short description, evidently another form.

650. *Blechnum levigatum* Cav. Descr. 263. 1802 (not of authors). — Syn. *B. distans* Pr. Tent. 103, Epim. 105. 1849. — Plate IV.

Locality quoted: Bahia Botanica (Botany Bay) N.S. Wales. NÉE! but it is beyond doubt false.

CAVANILLES' untrustworthy localities have often made the identification of his new species impossible on basis of his descriptions only, but rarely have they caused so great and regrettable confusion as here. *B. levigatum*



(*laevigatum*) was without doubt collected in South America and presumably near Montevideo or Buenos Ayres. The type-specimen agrees in every detail with several specimens from S. Brazil and Uruguay in my herbarium, which certainly belong to *B. distans* Pr., and it shows all the characters ascribed by PRESL to *B. distans*. It is *stoloniferous*, the leaves very thin, pellucid and glanduloso-pubescent throughout, the pinnæ mucronate, the lower 2 pairs free and distant, the indusia pubescent, etc. One leaf is larger than any seen before, the very slender stipe 15 cm., the broadly lanceolate lamina ca.  $20 \times 8$  cm. The species is quite different from *B. occidentale*, to which *B. distans* was referred in Index; on the other hand it may be doubted, if *B. glandulosum* Link and *B. meridionale* Pr. are really distinct from *B. laevigatum* Cav. (Cf. ROSENSTOCK: Hedwigia 46: 95. 1906).

In deference to the locality given by CAVANILLES, R. BROWN gave the name *laevigatum* to a totally different Australian species (Prodr. 152. 1810), and this has since by all authors been called so, e. g. by PRESL, Epim. 121 (as *Orthogramma laevigata*), and HOOKER, sp. 3: 55, pl. 160, who states that *Parablechnum ambiguum* (Klf.) Pr. Epim. 109 is the same. This identification of *B. laevigatum* Cav. is surprising, as the two species have nearly nothing in common, and PRESL had clearly his doubt, writing (l. c. 121): Frondes coriaceae, nec herbaceae nec semidiaphanae, nisi juvenes steriles; CAVANILLES said: hojas son de un verde claro, casi transparente.

The question is now, which is the right name of *B. laevigatum* R. Br.; PRESL quoted as synonym *Lomaria scabra* Klf. in SIEB. Syn. Fil. n. 107, but this name is invalidated by *B. scabrum* Liebm. 1849. Under *Parablechnum ambiguum* he quoted *Blechnum ambiguum* Klf. in SIEB. Syn. Fil. n. 106, which number in Herb. Hooker is *B. laevigatum* R. Br. according to HOOKER, l. c. *Blechnum ambiguum* Klf. must thus be the best name and a very appropriate one indeed for this so badly named species.

651. *Blechnum longifolium* Cav. Descr. 263. 1802 = *B. orientale* L.

Type-locality: Marianne Isl. Other specimens in Herb. Cav. from the Philippines. NÉE!

A very typical form.

653. *Woodwardia caudata* Cav. Descr. 264. 1802 = *Doodia caudata* (Cav.) R. Br.

Type-locality: Australia, no doubt Botany Bay, N.S. Wales. NÉE. Not seen, but certainly always rightly interpreted.

655. *Lindsaea elongata* Cav. Descr. 265. 1802 = *L. stricta* Dry.

Type-locality: Panamá. NÉE. "Tambien se cria en Puerto-Rico."

Not seen in Herb. Cav. but a specimen in Herb. Sw. named by CAVANILLES but without locality is typical *L. stricta*.

656. *Pteris pectinata* Cav. Descr. 266. 1802 = *Blechnum loxense* (Kunth) Hieron. Hedwigia 47: 240. 1908, C. CHR. Index Suppl. I. 16 cum syn.

Type according to CAVANILLES from Marianne Islands. 1. NÉE!, but no doubt from Andes.

In Ark. för Bot. 9 no. 11. 43 I have shown that this is a species of *Blechnum* § *Lomaria*. The single frond in Herb. Sw. is perfectly identical with two others, also fertile, in Herb. Cav. I have seen in Herb. Berlin a fair number of andine specimens, which in every detail agree with *P. pectinata*, while on the other hand no known species from the eastern hemisphere resembles it, and it may hardly be doubted that NÉE collected it in Andes, probably in Ecuador. The name *pectinata* is the oldest but invalid in *Blechnum*. The synonymy given by HIERONYMUS is right, but I should add *B. Stuebelii* Hieron. l. c. 241, pl. 4 f. 14. This figure illustrates the type of *P. pectinata* very well. *B. loreense* is especially characterised by the short, obtuse, involute fertile pinnæ and the densely paleaceous rachis.

657. *Pteris ternifolia* Cav. Descr. 266. 1802 = *Pellaea ternifolia* (Cav.) Link;  
C. CHR. Index 483 cum syn.

Type from Peru: Guarimaya valley, near Guamantanga, 1. NÉE!;  
also specimens from Mexico, 1. NÉE.

658. *Pteris lucida* Cav. Descr. 266. 1802 = *Adiantum lucidum* (Cav.) Sw.  
Syn. 121.

Type from Ecuador, Guaranda. 1. NÉE!; "y tambien en Filipinas"  
(Cav.).

Not seen in Madrid but a specimen in Herb. Sw., named *A. lucidum* by SWARTZ himself is no doubt a cotype sent by CAVANILLES. It agrees excellently with his description and belongs no doubt to the well-known American *A. lucidum* Sw. HOOKER (Sp. 2: 4) was of opinion that *P. lucida* Cav. from the Philippines "has probably nothing to do with it", evidently overlooking that CAVANILLES quoted Guaranda as type-locality and this place is under no. 664 (*Pt. lendigera*) said to be situated "en el Reyno de Quito". The additional locality, the Philippines, is like many others evidently false.

659. *Pteris aurantiaca* Cav. Descr. 266. 1802 = *Cheilanthes aurantiaca*  
(Cav.) Moore; C. CHR. Index 172 cum syn.

Type from Mexico, Chalma, 1. NÉE!

660. *Pteris lutea* Cav. Descr. 267. 1802 = *Cheilanthes aurantiaca* (Cav.)  
Moore.

Type from Mexico, Chalma, 1. NÉE!

In Ark. för Bot. 9 n. 11. 42 I have shown that *P. lutea* Cav. is identical with *Allosorus ochraceus* Hook., which by most authors is called *Ch. aurantiaca*, but I dared not unite the two species of CAVANILLES. Having now seen the rich original material of both I can with certainty unite them. None of the differential characters described by CAVANILLES (pinnæ opposite or alternate, pinnules entire or incised, colour of the under side) is constant.

661. *Pteris sagittata* Cav. Descr. 267. 1802 = ***Pellaea sagittata*** (Cav.) Link.  
Type from Mexico, Cerro de Guadeloupe. NÉE!

662. *Pteris cordata* Cav. Descr. 267. 1802 = ***Pellaea cordata*** (Cav.) J. Sm.;  
C. CHR. Index 479.

Type from Mexico, Chapultepec. NÉE!

No. 661 and 662 are two well-known Mexican ferns, by some authors considered distinct species, by others two forms of the same, *P. cordata*. Following the latter treatment I should prefer to call the species *P. sagittata*, which name is the first and was given to the most developed form.

663. *Pteris incompleta* Cav. Anal. Cienc. Nat. 4: 107. 1801, Descr. 267. 1802  
= ***Pteris arguta*** Ait.

Type from Tenerife and Tanger.

664. *Pteris lendigera* Cav. Descr. 268. 1802 = pro parte ***Cheilanthes lendigera***  
(Cav.) Sw.

Type from Guaranda, en el reyno de Quito, and Ixmiquilpan, Mexico.

SWARTZ redescribed this species (Syn. 318) after a leaf received from CAVANILLES (Herb. Sw.), which belongs to the well-known woolly species since always called *Ch. lendigera*. It is therefore puzzling to find that the two leaves presented to me by Prof. PRÓSPER and taken from a cover with numerous leaves and the label "Nova España" both belong to the paleaceous *Ch. myriophylla* Desv. It is probable that the original material is a mixture of both species or that the specimens from Guaranda belong to *Ch. lendigera* Sw. It is therefore best to use this name for the woolly species.

667. *Pteris sulphurea* Cav. Descr. 269. 1802 = ***Notholaena sulphurea*** (Cav.)  
J. Sm.; C. CHR. Index 463 with the first synonyms.

Type from Mexico, Chimapan, l. NÉE!

This belongs to a group of closely related Mexican ferns, which by older writers were regarded as forms of one species, *N. sulphurea*, while now some of them are dealt with as distinct species. The name *sulphurea* must be confined to plants with short deltoid leaves and yellow powder.

668. *Pteris glauca* Cav. Descr. 269. 1802 = ***Acrostichum glaucum*** Cav. Anal.  
Hist. Nat. 1: 107. 1799 = ***Cheilanthes glauca*** (Cav.) Mett.; C. CHR.  
Index 175 cum syn.

Type according to CAVANILLES from "el distrito Huanajuato, en la Nueva-España" (Mexico), l. NÉE, and in Herb. Cav. are specimens with label: Nova Hispania, but besides these another cover with numerous specimens and the label: Cordillera del Portillo en los Andes de Chile, NÉE. All belong to the common Chilean *Ch. glauca*, which does not occur in Mexico, which locality is quoted in most handbooks but now must be cancelled.

669. *Pteris longifolia* Cav. Descr. 271. 1802 (not L.) = *P. multifida* Poir.

Described from a single leaf taken in Jardin botanique, Paris, 1783, from a plant said to be introduced from Santo Domingo, which is less probable. It is perfectly identical with the type of *P. multifida* (!), which also was based on specimens cultivated in Paris.

671. *Vittaria filiformis* Cav. Descr. 270. 1902 = *V. lineata* (L.) Sm. forma?

Type from Peru. NÉE!

The type-specimen is without rhizome and therefore rather indeterminate, but the very long and narrow leaves are like those of *V. lineata*.

672. *Vittaria incurvata* Cav. Descr. 270. 1802; C. CHR. Index Suppl. III. 194. — Syn. *V. anodontolepis* Fée, Hist. Vitt., 93 t. 4 f. 3. 1852.

Type from Guam. NÉE! Also Luzon t. CAV.

PRESL (Rel. Hænk. 1: 58) referred this wrongly to *V. ensiformis* Sw. The scanty type seen is clearly marked by the fully entire rhizome-scales, exactly like those of *V. anodontolepis*, which also was based on specimens from Guam. Specimens from the same island leg. N. J. ANDERSSON and identical with *V. incurvata* were named *V. elongata* var. *anodontolepis* by METTENIUS. It falls under *V. elongata* Sw. sensu latissimo but seems worthy of specific rank.

675. *Adiantum lindsæa* Cav. Descr. 271. 1802, C. CHR. Index Suppl. III. 271 = *A. hispidulum* Sw. 1801 sensu propria (see below).

Type-locality quoted: Tambo, Mt. San Antonio, Quito. NÉE! but certainly false.

My fragment of this, never before identified species was some years ago examined by Dr. MAXON, who declared that it was not referable to any American species. I listed it, therefore, as a valid species in Index Suppl. III, but later on I became suspicious, knowing the numerous false localities quoted by CAVANILLES; the possibility of the species being oriental should be considered, and the whole type-material now at hand proves that this is in reality the case. It matches into the smallest details specimens from New South Wales of *A. hispidulum*, which was described from specimens from the same country, probably Botany Bay, a place also visited by "Malaspina". It agrees also very well with specimens from Luzon, e.g. COPELAND: Pteridophyta Philipp. exsicc. no. 120 (erroneously distributed as *A. hirsutum* Sw.). But these differ a little from the Australian ones and from *A. lindsæa* by the rather few but long and erect setæ on the under side, which in *A. lindsæa* is more densely pubescent with subappressed, stiff, antrorse, short hairs and without or with very few longer erect ones.

After having written this I found another better specimen of the type-material in Herb. Rodriguez and was very pleased to see that on the label it was first credited to "Bahia botanica", which locality, however, was cancelled and replaced by "Reyno de Quito". I am therefore convinced that *A. lindsæa* was collected in N.S. Wales.

During the last century *A. pubescens* Schkuhr, Kr. Gew. 1: 141 pl. 116 (*A. pedatum* Forst.) has been referred to *A. hispidulum* as a synonym. It is, I believe, a mistake. The plate illustrates a larger, pedately branched species, while the genuine *A. hispidulum* is a smaller, 2-3-pinnate species with very few, mostly only one pair of lateral pinnæ. Excellently agreeing with the plate are beautiful specimens from New Zealand received from the late H. CARSE. They are pedately branched like *A. pedatum* with up to 10 or more upright branches, the central ones to 20 cm. long, of a deep green colour. The type-locality of *A. pubescens* is said to be Tahiti, but my Tahitian specimens belong to *A. hispidulum*. It is very probable that it was collected in New Zealand by FORSTER, and I would now call the New Zealand "*A. hispidulum*" *A. pubescens* Schkuhr.

676. *Adiantum lunatum* Cav. Descr. 272, 1802 = *A. arcuatum* Sw. Syn. 122 = *A. philippense* L., C. CHR. Index Suppl. III. 19.

Localities quoted: Mariannes, Philippines and Acapulco (Mexico). NÉE. Not seen.

The above identification is certainly right. The locality Acapulco may be false or the specimens from there belong to one of the American species related to *A. philippense*.

***Humata* CAVANILLES Descr. 272. 1802.**

This genus, now generally adopted, was founded on the three species mentioned below. CAVANILLES gave it the name of a village, now Umata, on the west coast of the island of Guam, Mariannes Islands, south of the peninsula Orote. Of the three species, all belonging to the same genus, *H. ophioglossa* must be the type-species.

678. *Humata ophioglossa* Cav. Descr. 272. 1802, FÉE, Gen. Fil. t. 26 A f. 1 (excellent), C. CHR. in ELMER: Leaflets 9: 3161. 1933, Index Suppl. III. 112.

Type from Guam. NÉE!

This is by most pteridologists made a synonym of *H. heterophylla* (Sm.) Desv. but a careful comparison of the type with several Malayan specimens, which I consider typical *heterophylla* because they agree excellently with Hook. & GREV. Ic. Fil. pl. 230, has convinced me of *H. ophioglossa* being a distinct species. I describe the two species thus:

*H. ophioglossa* Cav. Rhizome scales squarrose, entire, hair-pointed. Sterile leaf on stipe 0.5—1.5 cm. long, the blade ovate-oblong, 3—5 cm long 1—2 cm wide, acute or obtuse, the base rounded or subcordate, the margins shallowly serrulate with a low notch between the veins. Fertile leaf on stipe 9.5—2 cm long, the blade 4—5 cm long, 8—10 mm wide, crenately incised  $\frac{1}{4}$  to  $\frac{1}{2}$ , with the short lobes separated by open rounded sinuses, each lobe with 2—3 sori, these often very close to the edge with a curved or obtuse tooth protruding beyond the lower one.

I know this species from Guam, Luzon and Caroline Isl.



*H. heterophylla* (Sm.) Desv. Rhizome scales usually very finely ciliate. Sterile leaf on stipe 1—4 cm long, the blade oblong, acute, 10—15 cm long 2—3 cm wide, the base rounded or short cuneate, the margins somewhat thickened and quite entire. Fertile leaf on stipe 1—2 cm long, the blade 10—13 cm long, 1.5 cm wide, incised  $\frac{1}{3}$  to  $\frac{3}{4}$ , the lobes oblong with 8—10 sori, sinuous without teeth protruding beyond the sori, these not close to the edge.

Widely distributed in Malaya and Polynesia.

679. *Humata pinnatifida* Cav. Descr. 273. 1802 = ***H. ophioglossa*** Cav. var.

Type from Guam. NÉE!

The type material in two covers contains besides sterile specimens which are typical *ophioglossa*, some larger fronds, which in general resemble *H. heterophylla* very much, but the entire scales, crenated margins and especially the sori show that they belong to a large form of *H. ophioglossa*. The fertile fronds are up to 15 cm long, incl. the 4 cm long stipe, 2.5 cm wide, incised to a wing 3 mm wide, the segments linear-oblong, obtuse, regularly rounded-dentate with a sorus to each tooth, the brown indusia ovate with their outer somewhat narrowed portion protruding beyond the edge; against the light they appear as pellucid brown membranes, which cover the open sinuses between the teeth. By this character, which less distinctly may be observed also in typical *H. ophioglossa*, it deviates manifestly from *H. heterophylla*.

680. *Humata trifoliata* Cav. Descr. 273. 1802. — Syn. *Davallia serrata* Willd. sp. 467 (change of name only), *Humata serrata* Desv. Prodr. 323, *Humata lepida* (Pr.) Moore, C. CHR. Index 353 cum syn.

Type-locality quoted: Marianne Isl., NÉE! but probably collected in Luzon.

The rich material in Herb. Cav. matches exactly Cuming no. 138 (Kew), the type of *Davallia Cumingii* Hook. sp. 1: 155, pl. 45 B, by PRESL himself identified with his *Pachypleuria lepida* (Epim. 99), and HOOKER's figure could very well be drawn after the type of *H. trifoliata*. The species is very near *H. repens* but a little dimorphous, stipe and ribs paleaceous and the segments sharply toothed.

682. *Dicksonia bipinnata* Cav. Descr. 174. 1802 = ***Dennstaedtia*** sp.

Described after a primary pinna received from Ventenat and probably from a cultivated plant. No locality quoted. Not seen.

WILLDENOW, sp. 5: 488, made it a synonym of his *D. adiantoides* = *Denn. adiantoides* (W.) Moore, perhaps rightly, but if so the name *bipinnata* has the priority.

683. *Dicksonia linearis* Cav. Descr. 274. 1802 = ***Tapeinidium lineare*** (Cav.) C. Chr. comb. nov. Syn. *T. biserratum* (Bl.) v. A. v. R. 1917, C. CHR. Index Suppl. III. 175 cum syn.

Localities quoted: Mariannes and Philippines. NÉE!

I noted in Madrid 1921: a small, short variety of *T. pinnatum*, then not considering the numerous 1—2—3-pinnate forms now united into a different species, *T. biserratum*, as specifically different. There is no doubt that CAVANILLES' description was written from one of these forms, and his species name must therefore replace *biserratum*.

684. *Hymenophyllum cruentum* Cav. Descr. 275. 1802, Hook. sp. 1 pl. 31 A.  
Type from San Carlos de Chiloe. NÉE!

685. *Hymenophyllum pectinatum* Cav.  
Descr. 275. 1802, Hook. sp. 1  
pl. 34D.

Type from San Carlos de Chiloe. NÉE!

686. *Hymenophyllum fucoides* Cav. Descr.  
275. 1802 (not Sw. 1801) = *H.*  
*fuciforme* Sw. 1806, Hook. sp. 1  
pl. 36D.

Type from San Carlos de Chiloe. NÉE!

687. *Hymenophyllum dentatum* Cav. Descr.  
276. 1802. Syn. *H. Bridgesii* Hook.  
sp. 1: 97 pl. 35C.

Type from San Carlos de Chiloe. NÉE!

These four Chilean species are well-known and HOOKER's figures quoted illustrate the types very well.

688. *Hymenophyllum dichotomum* Cav.  
Descr. 276. 1802 (not HOOKER  
sp. 1: 98, C. CHR. Index).

Type-locality quoted: San Carlos de Chiloe. NÉE!

According to my notes from Madrid 1921 and an authentic specimen in Herb. Swartz this is not the S. American species known during a century as *H. dichotomum*, the correct name of which now must be *H. plicatum* Klf. 1824, C. CHR. Index Suppl. III. 115. The wrong interpretation of the species of CAVANILLES is of course caused by the no doubt false locality given by him. The specimens were, I guess, collected in Luzon and in my opinion they belong to *H. Neesii* (Bl.) Hook. It is now remarkable that this was originally described and illustrated by NEES and BLUME as *H. dichotomum* (Nova Acta. 11: 127 t. 13 f. 4. 1823) which by HOOKER (sp. 1. 99) and v. d. BOSCH (Hym. Jav. 40) is quoted as a synonym of *H. Neesii*. The latter author considered, however, the Philippine form, *H. aculeatum* J. Sm., as a distinct

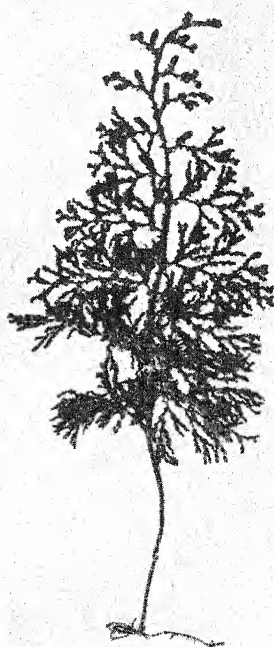


Fig. 1. *H. dichotomum* Cav.  
Herb. Sw. Nat. size.

species (l. c. 41), and because of this and the difficulty of separating clearly the many Malayan forms of *Leptocionia*, I do not find it advisable now to use the name *dichotomum* for *Neesii*, but a glance at the original figure of *H. dichotomum* Nees et Bl. will show its extreme likeness to the photograph of the leaf in Herb. Sw. of *H. dichotomum* Cav. here reproduced. The possibility may not be excluded that the type-material of the latter may contain some fronds of *H. plicatum*.

689. *Davallia pinnata* Cav. Descr. 277. 1802 = *Tapeinidium pinnatum* (Cav.) C. Chr.

Type from Luzon. NÉE! The other locality quoted, Chile, is of course false.

691. *Davallia ferruginea* Cav. Descr. 277. 1802 = *Stenoloma chusanum* (L.) Ching, C. Chr. Index Suppl. III. 173. (*Odontosoria chinensis* (L.) J. Sm.).

Type from Luzon: Prov. de Camarines. NÉE!

692. *Davallia retusa* Cav. Descr. 278. 1802 = *Stenoloma retusum* (Cav.) Fée, C. Chr. Index Suppl. III.

Type from Luzon, Mt. Isarrog. NÉE! perfectly matching HOOKER's figure, sp. 1 pl. 52A.

693. *Davallia glauca* Cav. Descr. 278. 1802 = *Dennstaedtia glauca* (Cav.) C. Chr. 1932, Index Suppl. III. 70. Syn. *Denn. Lambertiana* (Remy) Christ.

Type from Chile: Cordillera del Planchon. NÉE! This has always been a *species dubia* but it is not surprising to find it identical with *D. Lambertiana*.

694. *Davallia pyxidata* Cav. Descr. 278. 1802.

Type from Australia (i. e. Botany Bay). NÉE! Also Luzon is quoted. Always rightly understood.

695. *Davallia caudata* Cav. Descr. 279. 1802 = *D. solida* (Forst.) Sw.

Type from Luzon. NÉE!

The rich type-material belongs to the most common Malayan form, fairly well represented in Bedd. Ferns br. Ind. pl. 104 and excellently illustrated by HOOKER sp. 1: pl. 42B as *D. solida* var. *latifolia* Hook., which, if sufficiently different from the Polynesian type of *D. solida*, should be called var. *caudata* (Cav.). It is very different from the variety "*D. caudata* Cav." Hk. Bak. Syn. 95 = *D. Lindleyi* Hook. l. c. pl. 58B.

696. *Trichomanes rhizophylla* Cav. Descr. 279. 1802 = *T. pinnatum* Hedw.

No locality quoted but on a label in Herb. Cav. is written: Ex Panamá. NÉE!

Is typical *T. pinnatum*, not *T. pennatum* Klf.



697. *Trichomanes uniflora* Cav. Descr. 280. 1802 = *T. tenuifolium* Cav., Sw. Syn. 144 (non Burm.).

The locality quoted: San Carlos de Chiloe. NÉE! is certainly false.

This hitherto quite unknown species was no doubt collected in Luzon. The type-specimen is incomplete, consisting of three leaves, all very sparsely fertile and lacking rhizome, but they belong either to *T. grande* Cop. or to *T. maximum* Bl., probably to *T. grande*. All things considered I do not find it advisable to take the very inappropriate name *uniflora*(um) up for one of these species.

1155. *Cyathea percussa* Cav. Descr. (II). 548. 1803 = **Polypodium cyathoides** Sw. Syn. 37, C. CHR. Ark. för Bot. 9 no. 11: 39. 1910, Index Suppl. I: 124. — Syn. *P. verrucosum* Wall. sens. lat., *P. Koningsbergeri* v. A. v. R. 1908.

Type-locality quoted: Guam. NÉE!

I have shown in 1910 (loc. cit.) that this previously quite unknown species is a *Goniophlebium* and probably a form of the well-known *P. verrucosum* Wall. identical with *P. Koningsbergeri* v. A. v. R., which BACKER and POSTHUMUS refer to *P. verrucosum* (Natuurk. Tijdschrift Ned. Indie 91: 278. 1931). The actual type proves that I was right. It is large, the leaves 1—1.5 m long with numerous distant pinnae (not few as stated in 1910) and a similar terminal one. In technical characters: shape of pinnae, venation, immersed sori and paraphyses it does not differ from *P. verrucosum*, but the pinnae are narrower, 10 × 1 cm, than those of the common Malayan *P. verrucosum*. This difference seems to me rather insignificant.

1156. *Meniscium serratum* Cav. Descr. (II). 548. 1803 = **Dryopteris serrata** (Cav.) C. Chr. Index.

Type from Havana, Cuba, leg. JOSEPH GUIO!

- Ugena** Cavanilles, Icon. 6: 73. 1801, Anal. Cienc. Nat. 4: 251. 1801, Descr. (II). 551. 1803 = **Lygodium** Sw.

This genus was named in honour of Don E. MUGNOZ DE UGENA, a Spanish painter, known for his drawings and paintings of Spanish plants. It was published in Oct. 1801, probably later than *Ramondia* Mirbel and no doubt some months later than *Lygodium* Sw.

I have not seen the types of the five species described by CAVANILLES, but his figures in *Icones* make it possible to identify most of them. Only two need a few comments.

1161. *Ugena semihastata* Cav. Icon. 6: 74 t. 594 f. 1 and Anal. Cienc. Nat. 4: 251. 1801, Descr. (II). 552. 1803 = **Lygodium semihastatum** (Cav.) Desv. 1827, C. CHR. Index Suppl. I: 119.

Localities quoted: Mariannes and Philippines.

By most authors and in Index referred to *L. flexuosum* Sw., but recent collections from the Philippines, perfectly matching the original illustration,

show that it very well can be considered a distinct species, chiefly characterised by the semihastate or semicordate base of the pinnules.

1162. *Ugena dichotoma* Cav. Icon. 6: 74 t. 594 f. 2 and Anal. Cienc. 4: 251. 1801, Descr. (II). 552. 1802 = *Lygodium dichotomum* Sw. Syn. 174 = **L. circinnatum** (Burm.) Sw. var.?

Same localities as for the former species.

1163. *Ugena macrostachya* Cav. Icon. 6: 75 t. 594 f. 3 and Anal. Cienc. 4: 252(?). 1801, Descr. (II) 553. 1803 = *Lygodium longifolium* Sw. Syn. 154 = **L. circinnatum** (Burm.) Sw.

Same localities as for the two preceding species.

- Ugena polymorpha* Cav. Icon. 6: 75 t. 595 f. 1. 1801. Anal. Cienc. 4: 284. 1801. (not in Descr.) = *Lygodium flexuosum* (L.) Sw.?

Same localities quoted and "præsertim in oppido Nabua".

CAVANILLES himself identified this with *Ophioglossum scandens* L., which is the following species, while PRANTL (SCHIZ. 71), finding that the illustration agrees better with *L. venustum* Sw. than with *L. flexuosum*, identified it with the former American species, which since usually is called *L. polymorphum*, as in Index Fil. It is of course possible that the locality given is false, but Prof. MERRILL wrote to me some years ago that *U. polymorpha*, as to the description and specimen (not synonyms cited), clearly is *L. flexuosum*. He was probably right in this, but if not we should regard *U. polymorpha* as a species incerta and use the sure name *L. venustum* Sw. for the American species.

- Ugena microphylla* Cav. Icon. 6: 76 t. 595 f. 2. 1801 (not in Descr.) = **Lygodium scandens** (L.) Sw.

Same localities quoted and "præsertim in oppido memorato Nabua" (Prov. of Camarines Sur, Luzon).

- Clementea** Cavanilles, Descr. (II) 553. 1803. = **Angiopteris** Hoffmann.

The author named this genus in honour of his pupil SIMON ROXAS CLEMENTE. It is always rightly identified with *Angiopteris* but the only species was hitherto unknown.

1164. *Clementea palmiformis* Cav. Descr. 554. 1803 = **Angiopteris palmiformis** (Cav.) C. Chr. comb. nov. — Syn. *A. angustifolia* Pr. — Plate III fig. 8—9.

Type-locality quoted: Palapa, Guam. NÉE!

The type-material consists of three complete pinnæ, which in every detail agree with the Philippine species *A. angustifolia* Pr. to which PRESL himself with doubt referred it (Suppl. Pter. 21). The pinnules are very numerous (up to 50 pairs), 10—13 × 1—2 cm, below the acuminate and

serrate apex faintly crenate, the recurrent veins reaching halfway or more down, the sori remote from the edge. *A. angustifolia* from Luzon distributed by COPELAND (Pter. Phil. exsicc. no. 103) matches the type perfectly except in the margins being more evenly dentate. I do not know if *A. angustifolia* is recorded for Guam, but it is not improbable that NÉE found the species in Luzon. The only species from the Mariannes mentioned by DE VRIESE is *A. Durvilleana*, the type of which must be Tahiti, but his figures agree excellently with *C. palmiformis* and I do not hesitate to reduce *A. Durvilleana*, at least pro parte, to a synonym of *A. palmiformis*.

*Osmunda tenella* Cav. Icon. 6: 69 t. 592 f. 1. 1801 (not in Descr.). =  
*Anemia tenella* (Cav.) Sw. 1806, C. CHR. Index 54 (cum syn.?).

Type-locality: Mt. San Antonio, Ecuador. NÉE. (Not seen).

While PRANTL (SCHIZ. 127) cautiously considered this a *sp. dubia* Lindman (Ark. för Bot. 1: 260) identified it with *A. dissecta* Presl, Rel. Hænk. 1: 74 t. 11 f. 4, which was based on specimens from Mexico, leg. Hænke and to which PRESL later (Suppl. 88) referred specimens from Goyaz, Brazil, while PRANTL quoted it as a synonym under *A. ciliata* Pr. a Brazilian species. The two illustrations quoted are on the whole very similar and LINDMAN's identification seems to be quite justified, therefore I followed him in Index, overlooking the type-localities of both. Strangely enough, neither SODIRO (Cr. vasc. quit.) nor Underwood (N. Amer. Flora 16) mentioned these names, probably because they referred all corresponding forms to *A. hirsuta* Sw. and very likely they were right. Another question is whether the Brazilian form called *A. tenella* is the same or a distinct species. I can only say that my specimens resemble CAVANILLES' figure more than any form of *A. hirsuta*.

*Osmunda oblongifolia* Cav. Icon. 6: 69 t. 592 f. 2. 1801 = *Anemia oblongifolia* (Cav.) Sw. Syn. 156.

Type from Panamá. NÉE!

Recent collections from Panamá match perfectly a single frond of the type seen and the figure quoted. Several different looking Brazilian *Anemias* have been referred to this species, the typical form of which is confined probably to the northern South American Andes.

*Osmunda humilis* Cav. Icon. 6: 69 t. 592 f. 3. 1801 = *Anemia humilis* (Cav.) Sw. Syn. 156.

Type from Taboga Island, Panamá. NÉE. Not seen.

*A. Seemanni* Hook. was collected on the same island and no doubt is quite the same, thus not a variety as indicated in Index.

*Osmunda deltoidea* Cav. Icon. 6: 70 t. 593 f. 1. 1801 = *Anemia deltoidea* (Cav.) Sw. = *A. tomentosa* (Sav.) Sw. var.?

Type from Mt. Peña-blanca, pampas de Buenos Ayres. NÉE. See below.

1166. *Osmunda fulva* Cav. Icon. 6: 70 t. 593 f. 2. 1801. Descr. (II) 555.  
1803 = *Anemia fulva* (Cav.) Sw. Syn. 157 (an PRANTL?) = *A.*  
*tomentosa* (Sav.) Sw.

Type from Pan de Azucar near Montevideo. NÉE.

I have received several beautiful specimens from the late M. BERRO, collected on Pan de Azucar, which no doubt are typical *A. fulva*. They have been named *A. anthriscifolia* Schrad., but now I agree with Prof. G. HERTER, who is of opinion that *A. fulva* is a larger form of *A. tomentosa* (Osten & Herter: Pl. Urug. I. Pteridophyta p. 48. 1925), and *O. deltoidea* Cav. is, I think, a smaller form of the same. *A. fulva* Prantl is perhaps different.

***Aphyllocalpa*** Cavanilles (Anal. Cienc. 5: 164. 1802), Descr. (II) 556. 1803 = *Osmunda* L. s. restr.

1167. *Aphyllocalpa regalis* Cav. l. c. = ***Osmunda regalis*** L.
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IV.

Revision of the Bornean and New Guinean  
Ferns collected by O. BECCARI and described  
by V. CESATI and J. G. BAKER.

While working with Bornean and New Guinean ferns I found it often difficult to identify with certainty specimens, which I suspected to be referable to species described by CESATI. This Italian botanist was not specially acquainted with ferns as he undertook the determination of the collections made by O. BECCARI in Borneo and New Guinea, and BECCARI himself found no doubt his determinations untrustworthy, since he later sent the collections to J. G. BAKER at Kew, who renamed a considerable number of species. Following BAKER's revision BECCARI then published in his beautiful work "Malesia" new lists of the ferns collected by him. These lists are, however, not much better than those of CESATI, which is due chiefly to BAKER's conservative method of merging into one species several forms, which we now consider good species, and this together with the insufficient descriptions given by CESATI and BAKER have made an exact recognition of the forms described impossible. It is, therefore, no wonder that later pteridologists have failed to recognize most of the new species and often described them again under other names. A new revision seems therefore to be desirable. BECCARI's collections belong to the oldest made in the two big islands, and the names of the new good species found by him have priority. I publish here a second revision based upon BECCARI's own material.

Some specimens and several fragments of CESATI's species are at Kew, where I have seen them but the actual types are preserved in Istituto botanico, Firenze, where BECCARI's herbarium is preserved. By the kindness of Professor R. PAMPANINI, then appointed

to that institution, I got on loan some years ago all type-specimens and several others from Herb. Beccari, and on basis of them I have now prepared the following revision.

For loan of the specimens I render my best thanks to Sir ARTHUR W. HILL, Director of the Royal Botanic Gardens, Kew, to Prof. PAMPANINI and to the present authorities of the Botanical Institute, Firenze.

#### A. Ferns of Borneo, leg. Beccari.

First published in:

V. CESATI: Felci e specie nei Gruppi affini raccolte a Borneo dal Signor Odoardo Beccari. — Atti della R. Accademia delle Scienze Fisiche e Matematiche di Napoli, vol. VII, no. 8. 1877, pp. 1—37, pl. 1—4. — (Referred to in the following by "Cesati p.").

Later with BAKER's revised names by:

O. BECCARI: Malesia. Vol. III. Firenze 1886, pp. 17—30. (Referred to by "Beccari p.").

Nearly all specimens were gathered in 1865—66 in Sarawak in the vicinity of Kuching (Mt. Matang, Santubong, Poe and other places), a country rather thoroughly explored during the last thirty years by collectors for the Sarawak Museum, by Mr. C. J. BROOKS, Dr. F. MjöBERG and several others.

The sheet-number in Herb. Beccari proper is quoted under each species.

Among the specimens I find the following rightly named by CESATI and BECCARI, both, of course, following the nomenclature of Syn. Fil.

*Gleichenia dichotoma* Willd. (12210).

*Alsophila contaminans* Wall. (12223).

*Hymenophyllum borneense* Hook. (12237).

*Hymenophyllum Blumeianum* Spr. (12246).

*Hymenophyllum brachyglossum* A. Br. (12247).

*Hymenophyllum Neesii* Hook. (12248).

*Hymenophyllum Neesii* var. *aculeatum minus* Ces. (12249, a small form of *H. Neesii*).

*Trichomanes Motleyi* Bak. (12269).

*Trichomanes digitatum* Bl. (12315, is the form *flabellatum* v. d. B.).

*Lindsaya ovata* J. Sm. (12398).

*Polypodium sordidum* Hook. (12606).

*Antrophyum latifolium* Bl. (12728).

*Schizaea dichotoma* Sw. (12780).



*Gleichenia pteridifolia* Cesati, p. 2, *G. dichotoma* var. *divaricata* Beccari p. 17 = *G. linearis* (Burm.) Cl. var. *alternans* Mett. Ann. Mus. Lugd. Bat. 1: 51, pl. 4. (Herb. Beccari no. 12209).

This variety is common in the Malayan region and looks rather different from the typical *linearis* in branching, but HOLTUM does not consider it specifically distinct and says that the existence of two opposite pinnæ is frequently found in the commonest of the smaller forms of *G. linearis*. (GARDENS' Bull. S. S. 4: 62, fig. 1, 2. 1927). Two of CHRIST's species are found to be identical with var. *alternans*:

*G. subpectinata* Christ 1901 from Siam (Herb. Haun.) is typical *alternans*.

*G. Warburgii* Christ 1897. Of this two specimens named by CHRIST himself are to be found in Herb. Berol. 1) from Luzon (WARBURG 12220), 2) from Batjan (WARBURG 17634). The former is rather typical *alternans*, the latter a larger form once more forked.

*Cyathea Beccariana* Cesati, p. 3 = *C. assimilis* Hook., Beccari p. 17. (Herb. Beccari no. 12218).

*Cyathea Brunonis* Cesati, p. 3, Beccari p. 17 = *C. pseudobrunonis* Copeland. (Herb. Beccari no. 12219).

A common small tree-fern in the hills near Kuching, somewhat variable (*C. fuscopaleata* Cop. is to me a form) but seems always to differ from the true *C. Brunonis* Wall. (*C. moluccana* Index) in the wholly or nearly exindusiate sori. HOLTUM has, however, shown (GARDENS' Bull. S. S. 8: 299. 1935) that *C. Brunonis* varies considerably in the peninsula, also in the development of the indusia, and *C. pseudobrunonis* may therefore scarcely be maintained as a species.

*Alsophila vexans* Cesati p. 4, *A. glabra* var. Beccari p. 18 = *Cyathea glabra* (Bl.) Cop. 1909, Holtum, Gardens' Bull. 8: 316. 1935. (Herb. Beccari no. 12222).

I agree with HOLTUM in referring *A. vexans* Ces. (syn. *A. dubia* Bedd.) to the genuine Malayan *C. glabra*, which is specifically different from the Himalayan tree-fern by English botanists usually called *A. glabra*; it is now *C. gigantea* (Wall.) Holtum, loc. cit. 318. *Alsophila kohchangensis* C. Chr. is no doubt a young state of *C. glabra*.

*Hymenophyllum subflabellatum* Cesati, p. 8, Beccari p. 18 = *H. Lobbii* Moore (Herb. Beccari no. 12251).

A diminutive *Leptocionium*, often flabellately pinnatifid with 3—5 segments. A direct synonym of *H. Lobbii* is *Trichomanes* (sic!) *serratulum* Baker, based on the same collection.

*Hymenophyllum pachydermicum* Cesati, p. 8, Beccari p. 18. (Herb. Beccari p. 12252).

A common Bornean but hitherto misunderstood species because of a misprint in CESATI's description, where the measure "duo decimetra longa" should be "centimetra". *Trichomanes vestitum* Bak. 1894 and *Hymenophyllum Clemensiae* Cop. are direct synonyms and I cannot distinguish the Papuan *H. pedicularifolium* Cesati. See further remarks in Gardens' Bull. 7: 213, where *H. vestitum* should be *Trichomanes vestitum*.

*Trichomanes Beccarianum* Cesati, p. 8, Beccari p. 19. (Herb. Beccari no. 12298).

I refer to COPELAND: Phil. Journ. Sci. 51: 200.

*Trichomanes ignobile* Cesati, p. 9, Beccari p. 19 = *T. superbum* Backh. (*T. hispidulum* Mett.) stat. juv. (Herb. Beccari no. 12316). — Cf. COPELAND, loc. cit. 221.

*Trichomanes javanicum* Cesati p. 9 et var. *Zollingeri* Cesati p. 10, Beccari p. 19 = *T. singaporianum* (v. d. B.) v. A. v. R. (Herb. Beccari no. 12317, 12325).

*Trichomanes javanicum* var. *rhomboideum* Cesati p. 10, *T. foeniculaceum* Beccari p. 18 = *T. setaceum* v. d. B., COPELAND, loc. cit. 260 (Herb. Beccari no. 12330).

*Trichomanes meifolium* Cesati p. 20 = *T. pluma* Hook., Beccari p. 20. (Herb. Beccari no. 12300).

COPELAND (loc. cit. 265) was probably right in uniting *T. pluma* Hook. with the common Malayan species called *T. meifolium* Bory, or *T. longisetum* Bory (see v. d. B. Hym. Jav. pl. 21), or *T. ericoides* Hedw. all names first given to a species from Réunion. As pointed out by me (Dansk Bot. Arkiv 7:7) this seems to be rather different from the Malayan forms, which I therefore prefer to call *T. pluma*. *T. trichophyllum* Moore is the same.

*Trichomanes gemmatum* Cesati p. 10, Beccari p. 20, (Herb. Beccari no. 12295) is a scanty specimen of *T. pluma* Hook.

*Trichomanes brevipes* Cesati p. 11, *T. pyxidiferum* Beccari p. 20 = *T. Chri-stii* Cop. 1906 et loc. cit. 185. (Herb. Beccari no. 12296).

*Trichomanes saxifragoides* Cesati p. 11, Beccari p. 20 = *T. minutum* Bl. (Herb. Beccari no. 12289).

*Davallia deparioides* Cesati p. 13 t. 4 = *Lecanopteris deparioides* (Ces.) Baker 1881, Beccari p. 26. (Herb. Beccari no. 12703).

*Davallia luzonica* Hook., Cesati p. 13, Beccari p. 21 = *Tapeinidium lineare* (Cav.) C. Chr. supra p. 26 forma minus dissecta. (Herb. Beccari no. 12361).



*Davallia Beccariana* Cesati p. 14 = *D. pallida* Mett., Beccari p. 21 = *Leucostegia pallida* (Mett.) Cop. 1927, Index Suppl. III. 121, var. (Herb. Beccari no. 12355).

Not nearly so pale-green as the Polynesian form and the sori a little different.

*Lindsaya cultrata* var. *Lobbiana* Cesati p. 14, Beccari p. 21 = *L. Lobbiana* Hook. (Herb. Beccari no. 12379).

Believing that *L. lucida* Bl. might be an older name of *L. Lobbiana* (see Index Suppl. III. 122) I got by the courtesy of Prof. LAM a photograph of BLUME's type. It seems, however, to be *L. concinna* J. Sm.

(*Lindsaya trapeziiformis* var. *caudata* (Hook.) Cesati p. 14, Beccari p. 21).  
Not seen but no doubt the bipinnate form of *L. scandens* Hook.

*Lindsaya lobata* Cesati p. 15, Beccari p. 21 = *L. recurvata* Wall. (Herb. Beccari no. 12396).

*Lindsaya davallioides* Cesati p. 15, Beccari p. 21 = *L. parallelogramma* v. A. v. R.

*Lindsaya Fraseri* Cesati p. 15 (Herb. Beccari no. 12504) is a young frond of *Asplenium* sp., probably *A. polystichoides* (*A. nitidum* Becc. p. 23).

*Pteris longipinnula* Cesati p. 16, *P. quadriaurita* Beccari p. 22 (Herb. Beccari no. 12423) is, I think, a form of *P. Blumeana* Ag. approaching *P. flava* Goldm.

(*Asplenium longispinum* Beccari p. 23 is a misprint for *A. longissimum* Bl., Cesati p. 19).

*Asplenium polystichoides* Bl., Cesati p. 20, Beccari p. 23 = *A. nitidum* Sw. var.? (Herb. Beccari no. 12510).

This is a large fern, common in Sarawak and the peninsula and perhaps specifically different from *A. nitidum*. BLUME's name was, however, never published with a description; it was first mentioned by PRESL as a synonym of *Tarachia polystichoides* Pr. Epim. 260 (nomen), which I do not know. CESATI's plant is, however, identical with *A. glaucophyllum* v. A. v. R. 1912 and this though very inappropriate name should possibly stand, if the species is valid.

(*Asplenium subaquatile* Cesati p. 20 pl. 3 f. 5, Beccari p. 23). The type not seen but other Bornean specimens match perfectly CESATI's figure, yet with more spreading pinnæ. It varies greatly in size, from 15 to 50 cm in length, the pinnæ from 3 to 10 cm  $\times$  1 to 3 mm.

*Asplenium Zeylanicum* Cesati p. 21 = *A. porphyrorachis* Baker, Beccari p. 23 (Cf. my notes in Gardens' Bull. S. S. 7: 279). (Herb. Beccari no. 12508).

*Asplenium sylvaticum* Cesati p. 21, *A. speciosum* Beccari p. 23 = *Diplazium malaccense* Pr. (*D. Christii* C. Chr. Index). (Herb. Beccari no. 12524).

*Aspidium aristatum* var. *Hamiltonii* Cesati p. 23, Beccari p. 24 = *Polystichum puncticulatum* v. A. v. R., *HOLTUM*, Gardens' Bull. S. S. 7: 257. (Herb. Beccari no. 12530).

*Nephrodium Beccarianum* Cesati p. 23, Beccari p. 24 = *Dryopteris Beccariana* (Ces.) C. Chr. (Herb. Beccari no. 12538).

I have described this distinct species more exactly in Gardens' Bull. 4: 384. 1929. The name *D. brunescens* mentioned there should be *D. Teuscheri*.

*Oleandra neriiiformis* var. *brachypus* Cesati p. 23, Beccari p. 24 = *O. oblancoolata* Copeland. (Herb. Beccari no. 12584).

*Oleandra bantamensis* Cesati p. 24, Beccari p. 24 = *O. musifolia* (Bl.) Pr. (Herb. Beccari no. 12583).

*Polypodium gramineum* Cesati p. 24, *Vittaria lineata* Beccari p. 26 = *Vittaria longicoma* Christ. (Herb. Beccari no. 12734).

*Polypodium bisulcatum* Cesati p. 24, Beccari p. 24 = *P. setaceum* Copeland. (Herb. Beccari no. 12603).

COPELAND placed *P. setaceum* and *P. bisulcatum* Hook. in *Grammitis*, but both together with other related forms are in my opinion members of the large group of small species with entire, often dimorphous leaves (e.g. *P. Wrayi* Bedd.) which COPELAND placed in the polyphyletic genus *Microsorium* Link (cf. Index Suppl. III. 12 and 128) but certainly generically different from the typical species of that genus. The leaves of the two species are uniform, very long linear and extremely narrow and subsequently with the venation reduced apparently to the strong midrib, lateral veins wholly lacking or possibly reduced to short spurs sunk in the thick tissue. Very similar are the narrower forms of *P. taeniophyllum* Cop., the veins of which form a row of areoles at either side of the midrib.

I am not quite convinced that *P. setaceum* is a valid species. It may be a slender form of *P. bisulcatum*, of which I have seen the type only (Kew); its leaves are very thick and 2—2.5 mm wide, those of *P. setaceum* under 1 to 1.5 mm by up to 60 cm long, but otherwise I do not find any real difference.

*Polypodium flabellivenium* Baker 1867, Cesati p. 24 t. 3 f. 8, Beccari g. 25 = *Taenitis obtusa* Hook., Index Suppl. III. 175. (Type 1. BECCARI, Kew).

I was greatly surprised in finding this peculiar "*Polypodium*" to be a taenitidioid fern which the vestiture of the rhizome proved at once. It is namely chaetopteroid, i.e. consisting of castaneous, glossy, cylindrical hairs, exactly like those of *Taenitis blechnoides*. Further I can prove that *P. flabellivenium* is a small (young?) state of *T. obtusa* Hook., partly by

the fact that the type-sheet of *T. obtusa* contains besides that figured by HOOKER more small plants which match *P. flabellivenium*, partly by a fair number of other specimens, which form an unbroken row of forms, some of which were described as species. Though considerably different in size and shape of leaves and in sori the following forms agree in all essential characters.

*Pol. flabellivenium* Bak. is the simplest form with small, ovate, somewhat lobed leaves with usually free veins and few polypodioid sori. CESATI's figure is good.

*Polypodium holophyllum* Baker, Journ. of Bot. 1879: 43, from Lawas River, Brit. Borneo (BURBIDGE, Kew) is nearly the same with the leaves sometimes cordate, the sterile ones frequently lobed, the veins more regularly anastomosing. Like this but its leaves more regularly toothed and veins free are specimens from Sarawak: Lingga Mts. (HOSE 114, Kew). It is *P. flabellivenium* Christ, Farnkr. d. Erde 78 f. 207.

*Taenitis obtusa* Hook. Ic. Pl. t. 994 from Brit. Borneo (LOBB, Kew) is as figured the fully developed form with larger leaves, regularly anastomosing veins and confluent *Taenitis* sori, but as mentioned above the type-sheet contains besides several plants, which connect it with *P. flabellivenium*.

*Polypodium oodes* Baker, Journ. of Bot. 1879: 43 (not of KUNZE) from Brit. Borneo (BURBIDGE, Kew) is typical *obtusa* with more acute leaves and with the sori partly confluent.

*Taenitis drymoglossoides* Copeland, Phil. Journ. Sci. 3 C: 349, pl. 8. 1908, from Sarawak (BROOKS et HEWITT 20, Herb. Copeland) is another rather typical form with rounded-obtuse leaves.

*Taenitis Brooksii* Copeland, l. c. 6 C: 138 pl. 23A. 1911, from Bungo Range, Sarawak (BROOKS no. 3), is as described a narrow-leaved form, but a more interesting fact is, that in BROOKS' own collection preserved in Brit. Mus. Nat. Hist. more leaves with a pair of lateral pinnae below are to be found, thus developed into a pinnate state like *T. blechnoides*.

*Polypodium alternidens* Cesati, p. 25, t. 2 f. 4, Beccari p. 25. (Portion of type at Kew).

*Polypodium papillosum* Cesati p. 25, *P. Cesatianum* Bak. 1879, Beccari p. 25 = *P. coloratum* Copeland 1909. (Herb. Beccari no. 12658). — Fig. 2.

Concerning the name of this species COPELAND (Phil. Journ. Sci. 12 C: 62. 1917) pointed out a problem, which is a very intricate one and difficult to solve. *P. Cesatianum* Bak. is as originally published a *nomen nudum* given to the wrongly named *P. papillosum* Cesati; later CHRIST (Ann. Jard. Buitenzorg II. 5: 120. 1925), used the name for another Bornean specimen (HALLIER no. 3312) but also without description. Another specimen of the same collection was, however, amply described by v. A. v. R. Mal. Ferns 604 (1908) 1909. Not having seen BECCARI's specimen, v. A. v. R. could not be sure of his determination.

Having examined the types of all these specimens I arrived at the following results.

*P. Cesatianum* Bak. is exactly identical with *P. coloratum* Cop. Phil. Journ. Sci. 3 C: 347 pl. 6, January 1909. The rhizome-scales are dull dark-brown to nearly black, short-dentate and from a dilated lighter base narrowed into a long hair-like apex, rather harsh. Lower pinnæ not or hardly abbreviated. Venation rather irregular, usually with a row of costal areoles without included veinlets, the arching vein bearing a sorus on a short branch at the outer side midways, but the areoles are not always closed, the outer veins simple or branched, rarely anastomosing, their thickened tips ending rather far from the margin, which is more or less deeply serrate. (Fig. 2).

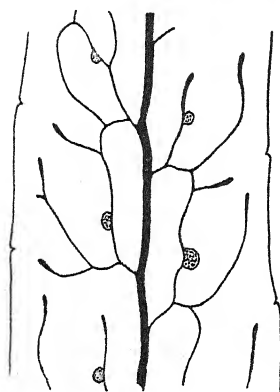


Fig. 2.  
Venation of *P. Cesatianum*  
Bak. (Kew),  $\times 6$ .

*P. Cesatianum* v. A. v. R. (HALLIER 3312, Herb. Christ and Herb. Buitenzorg) is essentially the same with similar but more sparsely and distantly ciliate scales, the lamina of some (not of all) leaves decrescent below with 5—6 pairs of abbreviated pinnæ, the basal ones about 0.5 cm. long, the pinnæ more obtuse. These differences seem too insignificant for treating this form as a species and I consider it a form of *P. Cesatianum* Bak. But I may be wrong and partly therefore and partly because the description of *P. coloratum* was published earlier than *P. Cesatianum* v. A. v. R., as far as I remember, I prefer to use the former name for these interesting Bornean ferns.

Another form of *P. coloratum* is in my opinion *P. brachypodum* Cop. Phil. Journ. Sci. 12 C: 62. 1917 from Mt. Kinabalu (TOPPING no. 1823, Herb. Copeland). It differs chiefly in its broader and softer scales and may be regarded as a local race. Similar specimens still nearer *P. coloratum* were collected by ENDERT 1925 (n. 3218) in Dutch S.E. Borneo: W. Koetai, Long Petak (Herb. Buitenzorg).

More deviating is *P. proavatum* Copeland, l. c. 3 C: 347. 1909 from Bungo Mountains, Sarawak (BROOKS and HEWITT, Herb. Copeland). It is a larger form, more coriaceous, the segments not nearly so close, separated above base by more than their own width, the lower ones reduced to a crenate wing to the stipes, the scales nearly black, lanceolate and hardly hair-pointed, distantly and shortly dentate. The segments are not quite entire but the revolute margins (revolute also in the living plant?) with extremely small notches about as in *P. Cesatianum* Bak. Specimens from Mt. Poe l. MJÖBERG are equal to this form in size but otherwise like *P. coloratum* except in the distinctly serrate segments. *P. proavatum* is, in view of the variation met with in this group of ferns, most likely a form or variety of *P. coloratum*.

COPELAND placed his three species in the subgenus *Goniophlebium*, but as already pointed out (Gardens' Bull. S. S. 7: 305. 1934) I do not

agree in this. The venation is not goniophleboid, being too irregular, and the costular areoles are without a fertile, free included vein. In my opinion it is essentially the same but less elaborated as we find in the group of *P. taeniatum* (*Phymatopsis* J. Sm.). Also the scale characters and the low notches of the segments correspond to those of *P. taeniatum*; still it is granted that *P. coloratum* resembles in habit more some species of *Goniophlebium*. I have shown (Dansk Bot. Arkiv 5 no. 22: 1928) that the simplest forms of *Goniophlebium* are free-veined, e. g. *P. vulgare*, and I suggest that similar free-veined forms may be the starting point of another series, of which such species as *P. coloratum* shows the first step towards the more developed anastomosis of the veins, which we find in *Phymatopsis*.

*Polypodium dilatatum* var. *grandidentatum* Cesati p. 27, Beccari p. 25 = ***P. grandidentatum*** (Ces.) Baker. (Herb. Beccari p. 12630).

Quite distinct from *P. dilatatum* Wall. (= *P. euryphyllum* C. Chr. Index = *P. Hancockii* Bak. 1885, Index Suppl. III. 150) by the much longer stipe, which is up to 50 cm long, narrowly alate in the upper fifth only and clothed with several linear, brown scales. The pinnae are at least towards the acuminate tips more or less coarsely dentate, the lower ones much more distant, 10 cm or more, the lowermost ones reduced to broad lobes or teeth to the wing. Veins raised on the lower, glossy surface, which gives the frond the appearance of a *Drynaria*.

*Gymnogramme edulis* Cesati p. 28, *Asplenium esculentum* Pr., Beccari p. 24 = ***Diplazium esculentum*** (Retz.) Sw. (Herb. Beccari no. 12515).

*Gymnogramme cartilagens* Baker 1868, Cesati p. 28 pl. 2 f. 3, Beccari p. 26, *Syngamma cartilagens* Diels 1899, Index = *Syngamma borneensis* (Hook.) J. Sm. (Type 1. BECCARI, Kew).

The only reliable difference between *S. cartilagens* and *S. borneensis* should be the broad, pale and toothed cartilaginous margins of the former, but the same is seen less pronounced in *S. borneensis*, and it seems that this fragile border is broken off with age. The fronds of both are mostly dimorphous (see CESATI's plate) but not rarely some of the shorter and broader oblanceolate leaves are fertile.

*Gymnogramme Feei* Cesati p. 29, Beccari p. 26 = ***Polypodium Mettenianum*** Cesati, p. 27, nota, Index Suppl. III. 153. (Herb. Beccari no. 12713).

*Gymnogramme Feei* var. *vulcanica* Cesati p. 29, Beccari p. 26 = ***Polypodium Mettenianum*** Ces. f. minor (= *P. Treubii* Christ). (Herb. Beccari no. 12711).

*Vittaria zosterifolia* Cesati p. 30, *V. elongata* Beccari p. 27 = *V. ensiformis* Sw.? (Herb. Beccari no. 12741).

*Vittaria minor* Cesati p. 30, Beccari p. 27 = ***Scleroglossum debile*** (Mett.) v. A. v. R. (Herb. Beccari no. 12735).



*Acrostichum Norrisii* Cesati p. 31, *A. Beccarianum* Baker sp. n. apud Beccari p. 27 = *Elaphoglossum Beccarianum* (Bak.) C. Chr. (Herb. Beccari no. 12771).

This is, I think, not really distinct from *Acr. Norrisii* Hook. from Penang, which by most writers were referred to *E. melanostictum* (Bl.) Moore. (See my remarks, *Gardens' Bull. S. S.* 7: 289).

*Schizaea dichotoma* Sw. var. b. *minor* Cesati p. 32 is *S. Biroi* Al. Richter, a common form in Borneo and by most writers referred to *S. dichotoma* (Herb. Beccari no. 12782).

### B. On some Ferns from New Guinea, leg. Beccari.

First published in:

V. CESATI: *Prospetto delle Felci raccolte dal Signor O. Beccari nella Polinesia durante il suo secondo viaggio di esplorazione in que' mari.* — *Rendiconto della R. Accademia dell' Scienze Fisiche e Matematiche di Napoli.* Vol. XVI, 1877, p. 23—31.

Later with BAKER's revised names by:

O. BECCARI: *Malesia.* Vol. III. Firenze 1886, pp. 30—53.

Only CESATI's new species and a few others are dealt with in the following.

Most specimens were gathered 1872 in Dutch Northwest New Guinea (Andai, Mt. Arfak, Ramoi and other places), some in Amboina.

*Dicksonia glabrata* Cesati p. 28, Beccari p. 32 = *Dennstaedtia glabrata* (Ces.) C. Chr. Index 217 emend. Suppl. III. 70. 1934. (Herb. Beccari 12231).

CESATI's species has hitherto been overlooked but being of a wide distribution (Celebes-Fiji) and often collected it has been described under many other names. After a close comparison of the actual types of the following "species" with CESATI's type I am sure that all of these belong to the same species:

*Denn. incurvata* (Bak.) C. Chr. Index. — Fiji (HORNE, Kew).

*Denn. rhombifolia* (Bak.) C. Chr. Index. — S.E. New Guinea (F. v. MUELLER, Kew).

*Denn. erythrorachis* (Christ) Diels. — Celebes (WARBURG 15327, Berlin).

*Denn. articulata* Copeland 1908. — Negros (ELMER 9771). — A form approaching *D. ampla*.

*Denn. articulata* Rosenstock 1912 = *D. Rosenstockii* v. A. v. R. 1912. — N.E. New Guinea (BAMLER no. W. 35. Fragm. in Herb. C. Chr.). Typical *glabrata*.

*Denn. erythrorachis* var. *aculeolata* v. A. v. R. Nova Guinea 14: 13. 1924. — Dutch New Guinea (LAM 1158, cotype, Kew).

The species was excellently described by ROSENSTOCK (FEDDE: Repert. 10: 322) as *articulata*. It is an ample species near *D. ampla* (Bak.) Bedd. but more divided, tripinnate-pinnatifid with smaller tertiary pinnules, Stipes 90 cm. long, 1 cm. thick at base, nearly black and densely muricate (especially below), the rachis terete and atropurpureous beneath, sulcate and cinnamon-coloured above. The secondary pinnules are articulated to the costa and easily loosened and together with the tertiary ones very characteristically furnished with a thick tuft of reddish tomentum at the base beneath. The sori are placed in deep sinuses, the indusia cup-shaped and bent downwards.

*Hymenophyllum pedicularifolium* Cesati p. 28, Beccari p. 32 = *H. pachydermicum* Cesati. (Herb. Beccari no. 12243.)

I cannot find the slightest difference between CESATI's two types (see above p. 35). The New Guinea type is small; larger but otherwise identical specimens were collected in British New Guinea, Mafulu, by L. J. BRASS no. 5355 (1933).

(*H. subtilissimum* Cesati p. 28; *H. obtusum* Beccari p. 32. — I have not seen this but it may scarcely be doubted that it is *H. pilosissimum* C. Chr. Gardens' Bull. S. S. 7: 213. 1934, as all other Papuan specimens of *O. obtusum* seen belong to it).

*Trichomanes pannosum* Cesati p. 28, Beccari p. 33 = *T. omphalodes* (Vieill.) C. Chr. (Herb. Beccari no. 12270).

Quite typical. This wide-spread species should perhaps be called *T. pannosum*, which name was published with description (1877) while *Microgonium omphalodes* Vieill. was quoted as a synonym of *T. pellatum* Baker by Fournier 1873.

*T. cognatum* Cesati p. 28, Beccari p. 33 = *T. Beccarianum* Cesati. (Herb. Beccari no. 12271).

This identification, originally due to COPELAND (*Trichomanes* p. 200), is right, I think, but the type is nearer *T. Motleyi* than the type of *Beccarianum*.

*Davallia corniculata* Ces. p. 25, *D. stenoloba* Bak. sp. n. apud Beccari p. 35 = *Tapeinidium moluccanum* (Bl.) C. Chr. Gardens' Bull. 4: 399. 1929, forma (syn. *T. stenocarpum* v. A. v. R. 1924). (Herb. Beccari no. 12339. — Amboina).

Slightly different from BLUME's type by the narrow, sublinear ultimate segments.

*D. asperima* Cesati p. 29, Beccari p. 35 = *Ithycaulon minus* (Bl.) C. Chr. Index Suppl. III. 116. (Herb. Beccari no. 12347. — Amboina).

Typical. BAKER considered it a variety of *Dav. moluccana* "Bl." (= *Ith.*

*minus*) but BECCARI maintained CESATI's species because he found it rather different from a specimen of "*molucaana*" sent by BAKER, but that specimen is from Samoa (I. Whitmee) and belongs to a rather distinct variety or perhaps species.

*Davallia longipinnula* Cesati p. 29, Beccari p. 35 = *Tapeinidium longipinnulum* (Cesati) C. Chr. Index Suppl. III. 176. 1934. (Herb. Beccari no. 12358).

Very near *T. pinnatum* but larger, the pinnae in about 20 pairs, 25 cm long by 1 cm wide, and sufficiently distinct by its dark-coloured, quadrangular rachis and strictly marginal sori, which are placed at the apex of the teeth and hardly longer than wide.

*Davallia intramarginalis* Cesati p. 29 = *Tapeinidium longipinnulum* (Cesati) C. Chr. forma (syn. *T. marginale* Cop. 1911). (Herb. Beccari no. 12357).

Differs chiefly from the type by the sori being twice as long as wide.

*Davallia decipiens* Cesati p. 29, *D. retusa* Cav., Beccari p. 35 = *Stenoloma retusum* (Cav.) Fée, C. Chr. Index Suppl. III. 173. (Herb. Beccari no. 12359).

CHRIST, Nova Guinea 8: 158, and COPELAND, Phil. Journ. Sci. 6 C: 82 maintained CESATI's species as an intermediate between *S. chusanum* (*Odontosoria chinensis*) and *S. retusum*, but I agree with BAKER in regarding it as a large and more compound form of the latter, size and somewhat shorter sori excepted, very closely resembling CAVANILLES' type. It is very much larger than *S. chusanum*: stipe 1 m or more long 1 cm thick at base, lamina 1 m, lower pinnae 35 cm long. HOOKER's figure, sp. fil. 1 pl. 52A, matches exactly a secondary pinna of an upper pinna or a tertiary pinna of a lower primary one, the frond being quadripinate.

*Lindsaya Lobbiana* Hook. and *L. securidifolia* Cesati p. 25, *L. cultrata* var. *Lobbiana* and var. *securidifolia* Beccari p. 36 = *L. brevipes* Cop. (Herb. Beccari no. 12386, 12387).

*L. brevipes* is a common species in New Guinea and quite distinct from *L. Lobbiana* by its long, narrow fronds with a very short (0—2 cm) stipes.

*Cheilanthes gigantea* Cesati p. 29, *Polypodium cheilanthoides* Bak. sp. n. apud Beccari p. 45, *Dryopteris brunneo-villosa* C. Chr. Index = *Dryopteris leucolepis* (Pr.) Maxon 1923, Index Suppl. III. 90. (Herb. Beccari no. 12660).

*Pteris papuana* Cesati p. 25, 29, Beccari p. 37. (Herb. Beccari no. 12421). Syn. *Taenitis Brausei* Rosenstock, Nova Guinea 8: 730. 1912, *Pteris Brausei* Ros. in C. Chr. Index Suppl. 66. 1913.

The original description of this fine species being very short and partly misleading I describe it anew.

The very thick, creeping rhizome densely rufo-tomentose with very narrow linear, hair-pointed scales, consisting at base of 5—6 rows of very

small cells, towards the tip of a single row. The solitary stipe strong, about 1 cm thick at base, 35 cm long, nearly black below, upwards atropurpureous and glossy as is the rachis, deeply sulcate and minutely downy by pale adpressed hairs above. Lamina about 75 cm long, thinly papyraceous, glossy, impari-pinnate. Pinnæ numerous, alternate, rather close, 20 cm long by 6—8 mm wide, long and finely acuminate, all cuneate at base, the lower ones distinctly stalked and forked from base with two equal divisions, the lowermost ones shorter and narrower and parted into three divisions, the upper ones sessile, simple; margins thickened, quite entire or here and there with some obscure, very rarely spinescent teeth; costæ brownish-stramineous, prominent and inconspicuously furfuraceous on both sides with minute, pale-brown hair-like scales, surfaces otherwise practically glabrous. Veins distinct, very close, about 35 per cm, nearly all simple. Sori narrow with very narrow, pale, soon evanishing indusia, sporangia mixed with brown paraphyses.

*T. Brausei* Ros. from Dutch New Guinea (v. ROEMER no 353) agrees perfectly with the type.

*Pteris pellucida* Cesati p. 25 = *P. papuana* Ces. var. *spinescens* var. nov. (Herb. Beccari no. 12422). A typo differt: major, pinnis sterilibus 30 × 1—1.5 cm, spinescenti-dentatis.

Approaches *P. moluccana* Bl. by the same characters but otherwise like typical *papuana*.

Prof. ROSENSTOCK has distributed another species as *P. papuana* Ces., which I consider new and name:

*Pteris Rosenstockii* sp. n. — *Eupteris* rhizomate stipite? Lamina ovata, elongata, 75 cm longa, coriacea, sicca laete-brunnea, superne nitida, pinnata, stipitis parte et rachi laete brunneis, paleis minutis pallidis decidue floccosis. Pinnis 18-jugis, oppositis, inferioribus 10 superioribus 3—4 cm inter se remotis, inferioribus brevissime petiolatis vel sessilibus, basi antice rotundato-truncatis postice excisis (i.e. costa lamina destituta), pinnulas 2—1 basiscopicas (interdum etiam unam acroscopicam) in parte inferiore ferentibus, ad 25 cm longis 8—9 mm latis, longe acuminatis, pinnulis paulo brevioribus, aequilatis; pinnis medialibus et superioribus simplicibus, ad rachin adnatis et decurrentibus, supremis alis cuneatis fere confluentibus; marginibus revolutis, integerrimis, costis inferne parce furfuraceis; venis indistinctis, densis. Sori continuis, indusiis angustis, integris, brunneis, sporangiis pilis lanosis intermixtis.

Papua (Kaiser-Wilhelmsland): Sattelberg, 8—900 m. April 1914, BAMLER (ROSENSTOCK: Fil. novoguineenses exsicc. no. 216, type in Herb. C. Chr. sub nomine *P. papuana* Ces.). — Ins. Batjan, WARBURG no. 17823 (less coriaceous).

From *P. papuana* this differs considerably by its coriaceous texture with hidden veins, lighter colour of the axes and chiefly by the decurrent upper pinnæ, but it is extremely near *P. opaca* J. Sm. and perhaps not quite distinct as a species. Size, texture and colour are the same, also the adnate-decurrent upper pinnæ, but many lower pinnæ are divided (in *opaca* all

simple) cut away at the lower base, decurrent and truncate at the upper (in *opaca* equally cuneate).

*Pteris longipinnula* Cesati p. 29, *P. concinna* Baker sp. n. apud Beccari p. 37 (non HEWARD 1838), *P. Beccariana* C. Chr. Index = *P. ligulata* Gaud. 1827, Hieron. Hedwigia 62: 29. 1920, Index Suppl. III. 168. (Herb. Beccari no. 12429).

*P. ligulata* Gaud. was a forgotten species until 1920 when HIERONYMUS proved its identity with *P. mixta* Christ 1905 and *P. heterogenea* v. A. v. R. 1913. I have seen the cotype-specimen in Herb. Berlin (from Rawak) and find it absolutely identical with *P. concinna* Bak. The type-specimen has four pairs of lateral pinnæ which below the up to 12 cm long entire tail are rather regularly pinnatifid. The figure of *P. heterogenea* v. A. v. R. Bull. Jard. Buit. II n. VII pl. 2 (type from the same locality: Andai) illustrates very well *P. Beccariana* being only more irregularly cut like the type of *P. ligulata*. This variation in cutting is evidently a pronounced character of the species; one can find simple pinnæ with undulate margins together with very uneven pinnatifid ones, sometimes with some segments much produced and again pinnatifid, or with regularly pectinato-pinnatifid ones, but all end in a long uncut tail. The same, very irregularly cut but with much shorter tail is *P. Walkeri* Bak. 1888 from Banggi Island (Hose, Kew), which no doubt is a form of *P. furcans* Bak. 1888 from Sarawak (Hose no 223, Kew), the pinnæ of which are pinnatifid to the tip. In my opinion *P. furcans* is an extreme form of *P. ligulata*, through *P. Walkeri* running into the typical form, or, if one prefers it, a geographical variety. All forms here united agree in having a black or castaneous stipes and rachis, few pinnæ (3—4 pairs), the basal ones forked. The species is a member of the *quadriaurita*-complex.

A variety of *P. ligulata* is *Cassebeera Woodfordii* C. H. Wright, Kew Bull. 1908: 183 = *Pellaea Woodfordii* C. Chr. Index Suppl. I: 54 from Solomon Islands, Florida Isl., Tulaji (C. M. WOODFORD, Nov. 1907, Kew). The occurrence of a species of *Cassebeera* in Melanesia was beforehand very improbable and I was not surprised to find the type to be a species of *Pteris* and so near some forms of *P. ligulata* that I prefer to consider it a variety of that variable species. The pinnæ are linear, 15—20 cm. long, 6—7 mm. wide, regularly crenate but here and there segments 2—3 cm. long are produced quite as in *ligulata* but they are much fewer. The leaf is coriaceous with invisible veins, bluish-green and with minute pale glands beneath; as to other characters it does not differ from *P. ligulata*.

*Asplenium Wightianum* Cesati p. 26, *A. Cesatianum* Baker sp. n. apud Beccari. p. 39. (Herb. Beccari no. 12495).

This is, in my opinion, a form of *A. persicifolium* J. Sm., differing a little from the type (CUMING 125, Kew) in the obtuse not sharp teeth and the tips of the pinnæ not nearly so coarsely serrate; it is not gemmiferous.



*Asplenium Beccarianum* Cesati p. 29, Beccari p. 40 = *A. bipinnatifidum* Bak. f. *gracilis* (syn. *A. Lauterbachii* Christ 1901, *A. oceanicum* C. Chr. Index). (Herb. Beccari no. 12496).

COPELAND pointed out (in his paper: Ferns of Fiji, Bishop Mus. Bull. 59: 63) that *A. oceanicum* and *A. bipinnatifidum* in Fiji run together, the former being a less dissected form of the latter, and a fine series of specimens from that archipelago collected by Mr. A. C. SMITH proves clearly that he was right. Further he wrote: "In New Guinea the diminutive *A. Lauterbachii* Christ is likewise connected by intermediates with the more wide-spread form". This is right too. *A. Lauterbachii* is a direct synonym of *A. Beccarianum* Ces., the type of which is a small, gracile form of a species that grows much larger in Papua; the most robust specimen seen was recently collected in British New Guinea by BRASS (no. 5280), and it is hardly to be distinguished from the Fijian *A. bipinnatifidum*. *A. oceanicum* (*A. obtusilobum* Hook. Ic. Pl. t. 1000) is the intermediate form.

*Asplenium subserratum* Cesati p. 26, *Triphlebia dimorphophylla* Baker, n. gen. et sp. apud Beccari p. 41—42, pl. 4 = *Diplora d'Urvillaei* (Bory) C. Chr. Index Suppl. III. 78. 1934. (Herb. Beccari no. 12525).

*Asplenium Linza* Cesati p. 29, *Triphlebia Linza* Baker apud Beccari p. 42, pl. 5 = *Diplora d'Urvillaei* (Bory) C. Chr. (Herb. Beccari no. 12526).

I refer to COPELAND's paper: On *Phyllitis* in Malaya etc. (Phil. Journ. Sci. 8 C: 147 f. 1913), in which he proved that the soral characters ascribed to BAKER's two genera, *Diplora* and *Triphlebia*, are inconstant and illusory, the actual structure of the sori being in reality the same as those of *Phyllitis*. He referred therefore all Malayan-Melanesian forms of the said genera, adopting three species only, to *Phyllitis*, but later on (Univ. Calif. Publ. Bot. 16: 73. 1929) he maintained *Diplora* (incl. *Triphlebia*) as a genus, and in this he was certainly right. *Diplora* as well as *Phyllitis* are offshoots of *Asplenium*, the former originating from a group of very similar Malayan species while the ancestors of the latter are obscure, perhaps belonging to an extinct group, since no known species of *Asplenium* from the geographical range of the genuine *Phyllitis* may be regarded as its near relative.

Besides the different origin the segregation of *Diplora* is justified by some morphological characters, especially the long, climbing, nearly naked rhizome, which is totally different from the short and very scaly rootstock of *Phyllitis*.

Having seen the types of BAKER's two genera I can affirm that they by no means differ from each other. I also agree with COPELAND in referring BAKER's two species named above to *D. d'Urvillaei*. *T. dimorphophylla* is the form with some leaves irregularly dissected (cf. KUNZE: Farrnkr. pl. 5).

*Aspidium phaeostigma* Cesati p. 29, Beccari p. 42 = *Dryopteris*(?) *phaeostigma* (Ces.) C. Chr. Index et Suppl. III. 94 (Syn. *Polystichum lastreoides* Rosenst. 1911, *Dryopteris Kingii* Cop. 1911 = *D. tamatana* C. Chr. 1913,

*D. Ledermanni* Brause 1920, *D. cyclosorus* v. A. v. R. 1924). (Herb. Beccari no. 12534). — Plate V, fig. 1—4.

A peculiar species, not unlike a bipinnatifid *Lastrea* but indusia large, orbicular and peltate, brown. The synonymy given shows that four prominent pteridologists have described a new Papuan species unaware of its identity with *A. phaeostigma*. I have seen the type of all and find them perfectly identical with CESATI's type; all specimens are remarkably uniform, though in some all indusia are fallen (types of *D. Kingii* and *D. Ledermanni*). The authors differ widely in their views of its systematic position. BAKER (Ann. of Bot. 5: 314) compared it with *D. crassifolia*, ROSENSTOCK placed it in *Polystichum* because of the peltate indusia, v. A. v. R. in *Dryopteris* subgen. *Cyclosorus*, COPELAND and BRAUSE in the subgen. *Lastrea*, the former in the group of *D. syrmatica*, the latter compared it with *D. sagenioides*. The views of BAKER and v. A. v. R. are in every respect wrong, and the species has nothing to do with *Polystichum* (see also COPELAND, Journ. Arnold Arb. 10: 177. 1929). BRAUSE's view may better be defended because the venation is not unlike that of *D. sagenioides*, i.e. *D. obscura* (Fée) Christ, (C. CHR. Index Suppl. III. 92) the branches of the forked veins being spaced out; but COPELAND comes, I think, nearest to the truth in associating the species with *D. syrmatica*. The venation and the characteristic dentation of the distal third of the segments are essentially the same, but as to other characters it differs widely: the peltate indusia, the fuscous-brown colour of the dried leaf, the lack of a tooth at the bottom of the sinus and the costæ being deeply sulcate above. The stipe and lamina are naked and glabrous throughout like other species of the *syrmatica*-complex but quite unlike are the erect rhizome and the actual bases of the stipe, which are furnished with numerous castaneous, lanceolate-linear, entire scales, up to 4 cm long by 1—1.5 mm wide.

Because of these differences I dare not associate the species with *D. syrmatica*, which has recently been made the type-species of a new genus, *Pteridrys* C. Chr. et Ching, Bull. Fan Mem. Inst. 5: 125 f. 1935. It could perhaps provisionally be dealt with as a special subgenus of *Pteridrys*, which in any case should be more natural than placing it in *Dryopteris*, but I have little doubt that it represents a new genus, which, however, should be based on better material than I possess at present.

*Aspidium calcareum*? Cesati p. 26, *A. Beccarianum* Baker sp. n. apud Beccari p. 43 = *Tectaria Cesatiana* (C. Chr.) Copeland 1911; Ind. Fil. Suppl. III. 178. (Herb. Beccari no. 12536).

In habit and division not unlike the typical form of *T. subtriphylla* but stipe and rachis ebenous, texture firmer and indusia orbicular, peltate, reddish-brown with blackish centre. Costæ rufo-tomentose above, the margins short-ciliate, lamina otherwise glabrous. Sori dorsal or on short spurs, but long free included veinlets none. The pinnatifid apical portion is short-cuneate at base, not decurrent.

*Nephrodium*? *tuberculatum* Cesati p. 29, Beccari p. 43 = *Dryopteris tuberculata* (Ces.) C. Chr. Index et Suppl. III. 100. (Herb. Beccari no. 12539).

(Syn. *D. Schlechteri* Brause 1912, *D. schizophylla* v. A. v. R. 1924). — Plate V, fig. 6.

A large bipinnatifid species belonging to a group of the subgenus *Lastrea* which is rich in species in Malaya and Papua. It differs from the genuine *Lastreas* in the non-decrescent lamina and in the basal acroscopic vein running to the bottom of the sinus, below which a prominent keel running down to the costa beneath may often be found, about as in the American subgenus *Steiropteris*. — The stipe of *D. tuberculata* is at base furnished with thick, obtuse tubercles, but no scales are seen and pneumatophores none. Costæ beneath nearly glabrous, light-brown, like the costules sharply keeled, above brown-strigose, the surfaces otherwise glabrous but with a tuft of short hairs at the sinuses, sometimes pustulose. Segments falcate, up to 3 cm long, by 4 mm wide, acute, entire, with 20—25 pairs of simple, oblique veins. Sori very near the costule, small, indusia not found. The types of the two species quoted as synonyms above match perfectly CESATI's type.

*Oleandra articulata* Cesati p. 26 = *O. cuspidata* Baker sp. n. apud Beccari p. 44. (Herb. Beccari no. 12588).

Rhizome erect, the scales thick, blackish with brown edges, when young ciliate and ending in a long, spreading hairlike tip. Leaves in whorls or some scattered, phyllopodia 3—5 mm long with the joint at the base of the lamina. The finely cuspidate leaves are somewhat dimorphous, the largest sterile ones of the type  $12 \times 2.5$  cm, the fertile  $12 \times 1$ — $1.5$  mm, of fine specimens from British New Guinea (BRASS 5303)  $20$ — $28 \times 4$ — $5$  and  $20$ — $25 \times 1$ — $2$  cm respectively, papyraceous to subcoriaceous, naked or with a few blackish small scales on the lower part of the midrib beneath. Sori in a wavy line, 2—3, rarely 4—5 mm from the margins.

*Nephrodium giganteum* Cesati p. 26, *Polypodium andaiense* Baker sp. n. apud Beccari p. 45 = *Tectaria andaiensis* (Bak.) C. Chr. Index Suppl. III. 177. 1934. (Herb. Beccari no. 12697).

Stipe ca. 75 cm long, blackish castaneous below with a dense mass of crisped, narrow, rufous, linear scales, upwards like rachis cinnamon-coloured with few scales, trisulcate above and minutely puberulous in the furrows. Lamina 70 cm or more long, subcoriaceous, bipinnatifid or partly bipinnate, the short apex pinnatifid with an even (not lobed) wing between the segments. Pinnæ subopposite, at distances of 6—8 cm, the basal ones with three much elongated pinnatifid pinnules on the lower side, the basal one 11 cm long, equally pinnatifid on the upper and outer part of the lower side, middle pinnæ of large fronds up to 30 cm long, broadly lanceolate, acuminate, fully pinnate in the lower third, upwards pinnatifid to a wing 3—4 mm wide, of smaller fronds pinnatifid throughout; free pinnules patent, at distances of 2 cm broadly adnate to costa, oblong, about 4 cm long by 8 mm wide, obtuse, crenate, the segments similar, more oblique. Costæ minutely glanduloso-puberulous above (upperside otherwise glabrous), rather chaffy beneath with small brown scales, the

under surface microscopically glanduloso-puberulous. Venation pleocnemioid with one narrow costal areole and usually one row of angular areoles outside the costular ones; included veinlets none. Sori small, dark-brown, in 1—2 irregular rows close to the edges of the segments, exindusiate.

Apparently a distinct species near the more dissected forms of *T. irregularis*.

*Polypodium imponens* Cesati p. 29, Beccari p. 45 = **Dryopteris imponens** (Ces.) C. Chr. (Herb. Beccari no. 12668). (Syn. *Dr. armata* Rosenstock, Hedwigia 56: 351. 1915, from Sattelberg, 1. BANLER, Fil. novoguini. exsicc. n. 242). — Plate V, fig. 5.

A mighty fern related to *D. ferox*. I refer to ROSENSTOCK's excellent description which as well as his type matches perfectly the original specimen of *D. imponens*. The rachis is about 1 cm thick, minutely downy and grey-pubescent in the deep furrow above (as are the costæ above) and furnished with several subulate, terete, black-brown bristles, which are up to 1 cm long and ciliate with ascending hairs and, when broken off, leave their bases as short, straight, black spines. — *D. muricata* Brause is very nearly the same, differing chiefly by broader, flat basal scales and rather indistinct veins.

*Polypodium proliferum* Cesati p. 26, *P. arfakianum* Baker sp. n. apud Beccari p. 45 = **Dryopteris arfakiana** (Bak.) C. Chr. Index. (Herb. Beccari no. 12659). (Syn. *D. sepikensis* Brause 1920).

This belongs to the subgenus *Cyclosorus* sect. *Abacopteris* (Fée) C. Chr. Gardens' Bull. S. S. 7: 247. 1934, nearest *D. firmula* (Bak.) C. Chr. but lamina narrowed below and the fertile leaves somewhat contracted. — Rhizome erect, elongate, ca. 1.5 cm thick, with the leaves spirally arranged as in a tree-fern. Stipe applanate at base, 5—7 mm broad with rather many brown, firm, lanceolate-acuminate, entire scales, minutely grey-puberulous but soon glabrous, 6—10 cm long to the lowermost auricle. Sterile pinnæ very like those of *D. firmula*, 10—11 × 2.5 cm, sessile with a truncate or subauriculate base, shortly acute, regularly inciso-crenate, the lobes roundish-truncate 3—4 mm broad, 1—2 mm long, or subentire, lower 5—6 pairs of pinnæ much reduced, distant, the lowermost ones less than 2 cm long. Rachis brown, glossy, terete and minutely puberulous beneath, broadly channelled and brown-tomentose above and with some few hairlike fibrils; costæ and veins on both sides with grey hairs and the leaf-tissue of younger leaves with scattered very short hairs. Veins 8-jugate, 5—6 pairs anastomosing, the basal pair often meniscoid. Fertile pinnæ similar but narrower, 15—18 mm wide. Sori medial, in the type over-ripe and confluent, but traces of brown indusia may be found, sporangia glabrous. — *D. sepikensis* Brause from the Sepik-region is a smaller form with 4—5 pairs of veins and subsistent indusia, but quite like *D. arfakiana* in all important characters.

*Sepik* 1

*Polypodium Beccarianum* Cesati p. 30, Beccari p. 46 = *Tectaria Beccariana* (Ces.) C. Chr. Index Suppl. III. 177. 1934. (Herb. Beccari no. 12637). (Syn. *Polypodium ingens* Brause, Bot. Jahrb. 56: 200. 1920).

Like *T. vasta* in the broad-winged stipe and rachis, texture and venation but remarkable by the enormous wing of the stipe, which is 35—40 cm long and 3 cm broad at either side and suddenly rounded-truncate at the base above a wingless portion 10 cm long. Stipe and rachis purplish and rather chaffy beneath with patent, linear or subpiliform scales of the same colour. Pinnæ in four subopposite pairs below the conform terminal one, at distances of 12—15 cm, 30 × 10 cm, acute, elliptic, quite entire but the basal ones with a basiscopic lobe, the costæ and main-veins minutely glanduloso-puberulous at both sides, the surfaces otherwise glabrous. Main-veins at distances of 1.5—2 cm, upcurved and reaching to the edge, the veins somewhat prominent below, the areoles irregular, angular, often with free included, simple (rarely forked) veinlets. Sori small, dorsal or compital, mostly opposite in pairs along the transverse veins but some scattered may be found. I have found some small brown indusia.

*P. ingens* Brause (LEDERMANN 6582, Herb. Berol.) is in every detail the same, only the sori are not so near to the transverse veins. Also here I found small indusia. It is hardly to understand how BRAUSE could place this distinct *Tectaria* in *Polypodium* § *Pleopeltis*.

*Aspidium Bolsteri* Copeland, Phil. Journ. Sci. 1: Suppl. 252. 1906 is according to the description identical with *T. Beccariana*, I think. Later on (same Journal 2 C: 412) he considered it a very large plant of his older species *Tectaria Bryanti* Cop., of which I have seen a specimen at Kew (Bur. of Sci. no. 15870) and which I regard as a small form of *T. Beccariana* with only 1—2 pairs of segments. *T. Bryanti* Cop. and Ind. Fil. Suppl. III. 177 with synonyms should therefore be made a synonym or at best a form of *T. Beccariana*.

In Index Suppl. III. 177 I have quoted *Polypodium* (sic!) *Schultzei* Brause 1912 as a variety of *T. Beccariana*, but wrongly I think now. The type (SCHULTZE 263, Herb. Berol.) is similarly winged and the purplish stipe and rachis similarly yet much denser scaly, but the wing much narrower, under 1 cm wide and produced nearly to the stipe-base, the basal pinnæ seem to be considerably reduced, the largest about 30 × 5 cm, the costæ scaly beneath like rachis, the areoles smaller and nearly all with forked included veinlets. The sori are very different, extremely small, usually consisting of 1—4 sporangia, scattered over the whole surface, the larger compital but the sporangia often borne solitary along the veins, the sori appearing to be narrowly linear or nearly reticulate. They are certainly exindusiate. The species is therefore a distinct one and must be called *Tectaria Schultzei* (Brause) C. Chr. comb. nov.

*Gymnogramme pteridiformis* Cesati p. 30, *Notochlaena pteridiformis* Baker apud Beccari p. 49 = *Thysanosoria pteridiformis* (Ces.) C. Chr. Index Suppl. III. 187. 1934. (Herb. Beccari no. 12704). (Syn. *T. dimorphophylla* Gepp n. gen. et sp. in GIBBS: Dutch N.W. New Guinea 193, pl. 4. 1917).

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This remarkable fern, which BAKER *mirabile dictu* referred to *Notholaena*, is no doubt a very near relative of *Lomariopsis*, in general like *L. leptocarpa* but fructification peculiar. I can not believe, however, that it is a monstrous, atavistic form of that genus as it has been found twice in the same region, for *T. dimorphophylla* Gepp is the same species with somewhat more contracted fertile pinnae.

The climbing rhizome is clothed with few, early deciduous, roundish, peltate, brown scales. Stipe of the sterile leaf ca. 10 cm, the lamina 30 cm or more, impari-pinnate with a larger terminal pinna and 3 (8 in *dimorphophylla*) pairs of alternate sessile lateral ones, which are 12—15 × 2 cm, lanceolate to oblong, quite entire, acute and equally cuneate at base and articulated to the upwards alate rachis; costae with some black-brown, small scales beneath, the veins mostly simple, the whole frond glabrous. Fertile leaf similar but the pinnae much narrower, 5 or at best 10 mm wide, regularly crenate with small semiorbicular lobes, each corresponding to a vein, which terminates within the edge of the lobe and its tip bears a roundish to oblong exindusiate sorus. Spores bilateral with a broad perispore.

All things considered I conclude that *Thysanosoria* is a *Lomariopsis* with retained individual sori. The acrostichoid condition is now generally believed to be a late evolutionary state, and if so *Lomariopsis* may be derived from forms resembled *Thysanosoria*, which probably is derived from dryopteroid ferns.

*Taenitis simplicivenia* Cesati p. 30, *Vittaria sulcata* Beccari p. 50 = *Scleroglossum pusillum* (Bl.) v. A. v. R., C. Chr. Dansk Bot. Arkiv 6 no. 3: 27. 1929 (which see). (Portion of type at Kew).

*Acrostichum costulatum* Cesati p. 30, (Beccari p. 46 in obs.) = *Grammatopteridium costulatum* (Ces.) C. Chr. Dansk Bot. Arkiv 6 no. 3: 80. 1929 (which see). (Herb. Beccari no. 12644).

A cotype-specimen of *Gr. pseudodrymoglossum* v. A. v. R. in Rijks-herbarium, Leiden (LAM 826) is a small form of *G. costulatum*.

Besides the species mentioned above CESATI named two very imperfectly described "species" *Hymenophyllum puellum* (p. 24, 28) and *Lindsaea ambigens* (p. 25, 29), which are unknown to me.

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V.

## Descriptions of 36 new Species of Ferns.

During the last twenty years I have received a huge mass of fern-specimens for identification from private collectors or Botanical Institutions, some as a gift, others on loan. Some of the larger collections were the subjects of special publications of mine, in which the novelties were described, but not a few of the mostly smaller collections contained one or two new species, which remained unpublished until now. Besides these new collections I have named a considerable number of mostly older specimens preserved in various museums (Berlin, Kew, Leningrad, Paris, Stockholm, etc.), among which some undescribed species were discovered. I have now gathered the descriptions of a plurality of these new species together and publish them here in an alphabetical order, quoting everywhere in which herbarium the type-specimen is to be found.

*Adiantum palaoense* C. Chr. sp. n. — Rhizomate decumbente, fere 1 cm crasso, paleis angustissimis, brunneis, nitidis vestito. Stipite ad 30 cm longo, atrocastaneo, angulato, ad basin sparse paleaceo et, paleis delapsis, scabro et aculeolato, ut toto folio glaberrimo. Lamina deltoidea, 15—25 cm longa et lata, herbacea, superne subnitente viridi subtus glaucino-viridi, basi tri-vel quadripinnata, sursum bipinnata. Pinnis 5—6-jugis, basalibus ad 15 cm longis, petiolatis, basi utrinque 1—2 pinnulis II. ord. praeditis — basiscopica II. ord. ad 10 cm longa et interdum iterum ramosa — sursum simpliciter pinnatis, acuminatis; pinnulis ultimis dimidiatis, alternis, maximis 1.2 cm longis 8 mm latis, densis, apice rotundato-obtusis, dentatis — dentibus deltoideis, obtusis, anguste cartilagineo-marginatis — margine superiore incisura cuneiformi medio leviter bilobatis. Soris plerumque 2 ad marginem superiorem (rarius 3), uno oblongo 2—3 mm longo in lobo interiore, uno multo brevior in lobo exteriori, indusiis coriaceis, brunneis, leviter crenatis.

Pelew (Palau) Islands: Babelthoap, on the ground in primæval forest, LEDERMANN, Febr. 25th, 1914, no. 14437. (Typus in Herb. Berol.).

This is very near (perhaps too near) *A. monosorum* Baker from Solomon Isl. (not from New Caledonia as stated in Index) and *A. scabripes* Copel. from Mindanao, which I have considered to be the same species (see Ind. Fil. Suppl.), but perhaps I was wrong. The new species differs from these in being more branched and in colour.

**Asplenium trialatum** C. Chr. sp. n. — *Euasplenium* e grege *A. trichomanidis*, habitu et magnitudine *A. normali* Don simile, a qua specie differt: stipite rachique late trialatis. — Rhizomate breve, paleis atro-brunneis, lanceolatis, integris vestito. Foliis fasciculatis, numerosis, stipite (ut rachi) atropurpureo, 3—5 cm longo, trigono, angulis alis brunneis membranaceis, 0.5 mm latis instructis. Lamina 20—30 cm longa 2 cm lata, e medio utrinque attenuata, subcoriacea, glabra, pinnata: rachi superne plana angulis alatis, inferne tereti et dorso ala tertia instructa, alis brunneis, ad 1 mm latis. Pinnis numerosis, sessilibus, inferioribus rotundatis aliquot reductis, medialibus maximis, rhomboideis, 10—12 mm longis 5 mm latis, basi postice breve cuneatis antice truncatis et saepe subauriculatis, apice obtusissimis vel subtruncatis, marginibus breviter et obtuse irregulariter dentatis; venis vix perspicuis. Soris 4—5-jugis, medialibus, brevibus, crassis, nec marginem nec costulam attingentibus; indusiis griseis, integris.

China: Yunnan, on rocks in Ta-lan-ti valley, 400 m., E. E. MAIRE. (Type in Herb. C. Chr.). Western China, WILSON n. 5353 (Kew).

A most distinct species of robust habit with thick, fragile stipe, especially characterised by the rachis being furnished with three broad, membranous, continuous, brown wings.

**Athyrium Humbertii** C. Chr. sp. n. — Plate VI, fig. 7—9. — *Pseudallantodia* Clarke rhizomate adscendente, elongato, apice paleis atrocastaneis, linearibus (apice non filiformibus), integris, subcarnosis dense vestito. Stipite griseo-stramineo, folii minoris 30 cm longo, superne profunde trisulcato, glaberrimo. Lamina deltoideo-ovata, obscure viridi, herbacea, basi tripinnata-pinnatifida (minori bipinnata-pinnatifida); rachi straminea, in axillis superioribus gemmifera. Pinnis suboppositis, breve (1—2 cm) petiolatis, maxima visa lanceolata, 40 cm longa 16 cm lata; pinnulis alternis, 3 cm inter se remotis, recte divaricatis, breve (1—2 mm) petiolulatis, ad 8 cm longis, e basi aequaliter truncata 3 cm lata versus apicem serratum acuminatum sensim angustatis; pinnulis III. ord. recte patentibus, 7—9-jugis, infimis subliberis basi cuneatis, sequentibus in alam decurrentibus, supremis confluentibus, maximis 2 cm longis basi 8—9 mm latis, obtusis, grosse lobatis, lobis 4—5-jugis, obliquis; deltoideis, subacutis; lamina tota, costis superne et petiolis pinnarum II. ord. brevissime glanduloso-puberulis et paleis parvis persparse instructis exceptis, glaberrima. Venis liberis, in lobis ultimis pinnatis vel furcatis, pellucidis, marginem attingentibus. Soris costularibus, in pinnulis III. ord. majoribus 4—5-jugis, ovoideis vel oblongis, 1 mm vel paulo ultra longis, maturis 1 mm latis, crassis, nec confluentibus, infimis rarius diplazioideis, indusio membranaceo, tenuissimo, glabro, infero, statu intacto sorum perfecte amplexente, laete brunneo, maturo dorso

longitudinaliter dehiscente; sporangiis dense aggregatis, paraphysibus filiformibus, rufis, numerosis intermixtis.

Tropical Africa: Congo Belge. Montagnes à l'ouest du Lac Kivu, forêt, 2000—2400 m, février—mars 1929, H. HUMBERT no. 7497. (Type in Herb. C. Chr.).

A most interesting novelty to the African flora, being closely related only to some North Indian species, which CLARKE (Ferns N. Ind. 495) placed in a new subgenus, *Pseud-Allantodia* under *Asplenium*, which is characterised by the peculiar indusia, which are more woodsoid than asplenioid, being connate to the receptaculum at both sides and dehiscent by a longitudinal fracture at the back. This together with the always short, thick costular sori seem to justify the segregation of the species from *Athyrium* or *Diplazium* even as a genus. Our new species, the only African one of this group known to me, is very like *A. procerum* (Wall.) (cf. CLARKE, loc. cit. pl. 63 f. 1); its best character seems to be the presence of paraphyses, a most remarkable feature within the athyrioid ferns.

*Athyrium kutaiense* C. Chr. sp. n. — Rhizomate erecto, lignoso, ca. 1 cm diametro, fere nudo, stipitibus caespitosis, ad 50 cm longis, sordide griseo-stramineis, superne sulcatis, ut toto folio glaberrimis nudisque. Lamina ovata, 60 cm vel ultra longa, 35—40 cm lata, herbacea, sicca nigrescente, apice gemmifera, bipinnata-pinnatifida, rachi superne plana et elevato-marginata. Pinnis oppositis, 5—3 cm inter se remotis, maximis 25 cm vel ultra longis, 4—5 cm latis, basalibus paulo brevioribus, aequilateralibus, breve (5—10 mm) petiolatis, superioribus sensim brevioribus, sessilibus; costis superne planis marginatisque, spinis destitutis; pinnulis parum obliquis, densis, vix 1 cm inter se remotis, numerosis, sessilibus, subdeltoideo-oblongis vel oblongis, obtusis vel subacutis, 2 cm longis, 7—8 mm latis, infimis paulo brevioribus, fere ad costulam pinnatifidis; segmentis 8—10-jugis, obliquis perconformibus, ca. 1 mm latis, apice truncatis vel interdum subemarginatis, leviter oblique dentatis (basalibus magis lobatis), dentibus obtusis, utrinque binis; venis 2—3-jugis adscendentibus, simplicibus, in hydathodas angustas brunneas terminantibus; soris asplenioides, 4—5 pro segmento, ca. 1 mm longis, basalibus e costula remotis, indusiis rectis vel leviter curvatis, coriaceis, persistentibus, integris.

Dutch Borneo: W. Koetai, Kemoel, alt. ca. 1000 m., Oct. 3rd, 1925, F. H. ENDERT no. 3779. (Type in Herb. Buitenzorg).

A very distinct species, resembling somewhat some of the southern forms of *A. umbrosum* but quite different by the very regularly cut pinnules with dense small and quite uniform segments, by the persistent, coriaceous indusia and by the rachises being quite plane above with raised margins, just as in some species of *Pellaea*. The few scales found on the rhizome are dark-brown, ovate or suborbicular and seem to be peltately fixed.

*Athyrium pachyphlebium* C. Chr. sp. n. — Rhizomate? Stipite ca. 45 cm longo, viridi-stramineo basi fuscesciente, sulcato, paleis perpaucis pallidis lan-  
ceolatis onusto, mox nudo, glabro. Lamina ovata, ca. 40 cm longa 30 cm lata,

utrinque laete griseo-viridi, firmiter herbacea, bipinnata-pinnatifida; rachi straminea, subflexuosa, glabra, vix vel decidue et persparse paleacea. Pinnis 6—8-jugis, alternis, 8—6 cm inter se remotis, plus minusve adscendentibus, subdeltoideo-lanceolatis, ad 20 cm longis medio 6—7 cm latis (basalibus paulo brevioribus), breve acuminatis, inferioribus petiolo 1—1.5 cm longo stipitatis; pinnulis II. ord. alternis, ad 20-jugis, inferioribus breviter petiolulatis (petiolo alato), supremis adnatis et in alam angustissimam ad costam decurrentibus, basalibus pinnarum inferiorum plerumque abbreviatis medialium paulo productis, inframedialibus 3—4 cm longis 1—1.5 cm latis, patentibus vel subfalcatis, deltoideo-oblongis, acutis vel breve acuminatis, basi postice rotundato-cuneata antice truncata paulo inaequilateralibus, profunde pinnatifidis; lobis oblongis, obtusis vel subacutis, 5—7 mm longis 3 mm latis (basali acroscopica saepe longiore), obliquis, contiguis vel subimbricatis, dentatis, dentibus deltoideis; costis sursum alatis, superne sulcatis, sine spinis, glandulis minutis pallidis opacis praesertim ad insertionem costularum sat dense glandulosis, subtus stramineis, glabris, paleis linearibus pallidis perpaucis instructis. Venis in lobis pinnatis, 3—5-jugis, simplicibus, subtus prominulis, crassis, in hydathodas elongato-clavatas in dentibus terminantibus. Soris in parte dimidia apicali lorum positus, in venis medialibus vel margini magis approximatis, vix 1 mm longis; indusiis pallidis, oblongis, rarissime apice curvatis vel subdiplazioideis, integris vel parce fimbriatis.

China: Shansi, Yuan-ch'u district, Hsiung-shan-tung, prope pagum Yang-shu-ling, alt. 800 m., 1924, Dr. HARRY SMITH no. 6130. (Type in Herb. Univ. Upsaliense). — Shantung: Kiautschou, ZIMMERMANN no. 405 (Herb. Berol.).

Near some forms of *A. drepanopterum* (Kze.) Moore but larger with broader pinnules and not shining, especially marked by the thick, raised veins. The sori are confined to the outer half of the lobes of the type-specimen, but this is perhaps not the normal condition.

**Blechnum borneense** C. Chr. sp. n. — *Lomaria* rhizomate breve, erecto, apice paleis ovatis, acutis, castaneis, crassis, integris vestito, radicibus rufo-tomentosis. Foliis sterilibus (fertilibus non visis) subfasciculatis, stipite ad auriculam infimam 6—8 cm longo, basi solum paleaceo, infra tereti atrobrunneo, supra late sulcato pallidiore. Lamina late lanceolata, 20—25 cm longa, infra medium 10 cm lata, basi subito contracta, rigide coriacea, glaberrima, ad rachin pinnata. Pinnis 8—10-jugis, basi tota adnata non dilatata, contiguis vel confluentibus, sursum valde approximatis, maximis 5—6 cm longis 1.5 cm latis, subfalcatis, acutis, integerrimis, terminali latiore, inferioribus 2—3-jugis valde reductis, distantibus, adnatis, infimis 1—3 mm longis 3—4 mm latis; venis semel vel bis furcatis, subtus impressis, intra marginem revolutam in hydathodas terminantibus.

Dutch Borneo: Mt. Tibang, 1400—1700 m., Nov. 1925, E. Mjöberg. (Type in Herb. C. Chr. et Herb. Selim Birger, Riksmuseum, Stockholm).

In spite of having seen a sterile specimen only I venture to describe it as new. In size, division and shape of pinnæ it resembles *B. vulcanicum*



(Bl.) Kuhn, but it is thicker in texture, the basal scales quite different and especially marked by the much reduced lower pinnae. *B. Keysseri* Ros. from New Guinea is evidently similar but according to a sketch of the type received from ROSENSTOCK it is much larger with a long row of winglike abortive pinnae. The pinnate form of *B. Patersonii* is also similar but much larger with broader and not so close pinnae which are decurrent at base.

*Cheilanthes papuana* C. Chr. sp. n. — Rhizomate? (versimiliter erecto). Stipite valido, ad 25 cm longo, 3 mm crasso, atropurpureo, nitido, ad basin paleis nigris, crassis, lanceolato-acuminatis, integris et sursum aliis, obscure-brunneis, ovato-acutis, adpressis primum dense vestito, denique subnudato. Lamina lanceolata, ad 20 cm longa 4 cm lata, rigide et durissime coriacea, in sicco nigrescente brunnea, bipinnata vel subtripinnata; rachi crassa, paleis castaneis, late lanceolato-acuminatis, integris subtus densissime vestita. Pinnis alternis sessilibus, 1.5—1 cm inter se remotis, patentibus, latere basiscopico plus minusve producto inaequaliter deltoideis, maximis 2.5 cm longis basi 2 cm latis, acutis (apice ipso obtuso), basalibus aliquot brevioribus; pinnulis liberis 4—5-jugis, basali basiscopica maxima, ad 1 cm longa basi 3 mm lata et pinnata, ceteris 1.5 mm latis, linearibus, sessilibus, marginibus crenatis arcte revolutis; costis costulisque ut rachi subtus primum paleaceis, mox denudatis, atropurpureis, subtus valde prominulis, costulis praeterea glandulis capitatis pallidis sparse instructis. Indusiis castaneis, integris, intramarginalibus, continuis; sporangiis magnis, paucis.

Dutch New Guinea: Utaqua Expedition to Mt. Carstensz 1913, Camp. XII—XII, leg. C. BODEN KLOSS. (Type at Kew).

This very distinct and rather unique species was named *Cyathea Macgregorii*. It has the whole appearance of a high-alpine species with stout axes, and of an extremely coriaceous texture, the rachises very densely paleaceous beneath with rather large dark scales. The continuous, castaneous indusia are nearly hidden under the recurved crenate margins.

*Cyclophorus Dielsii* C. Chr. sp. n. — Plate VI, fig. 2. — (*Pyrrhosia Dielsii* C. Chr.). — Rhizomate tenui, vix ultra 1 mm crasso, longe rampante, ramoso, paleis peltatis imbricatis, ovato-lanceolatis, acutis, crassis, atro-castaneis margine laetioribus floccoso-ciliatis adpresse vestito. Frondibus subconformibus, ad phyllopodia 1 mm alta articulatis, stipite 1—1.5 cm longo, lamina crassa, coriacea, versus basin aequaliter cuneata, sterili obovata, 3 cm longa infra apicem rotundato-truncatum 1 cm lata, fertili spatulata, ad 5 cm longa 1 cm lata, lateribus supra partem cuneatam parallelis, apice recte truncato vel retuso; pagina superiore tenuiter, inferiore dense stellato-tomentosa, aetate subnuda; pilis stellatis imbricatis, centro disciformi parvo brunneo, ramis 10—12, planis, hyalinis. Soris superficialibus, utrinque 7—9 secus marginem uniseriatis, globosis, magnis, 1.5 mm vel ultra diametro, distinctis vel supremis saepe confluentibus, juvenilibus tomento stellato obtectis.

Queensland: Upper Barron, epiphytic on the upper branches of big trees in primæval forest, c. 500 m. L. DIELS, May 25th, 1902, no. 8406. (Type in Herb. Berol.).

Closely related to *C. confluens* (R. Br.) C. Chr. but quite unique by the shape of the fertile fronds and the large sori, which protrude beyond the margins at maturity.

**Diplazium Birgeri** C. Chr. sp. n. — *Anisogonium* rhizomate? Stipite sat gracili, 3 mm crasso, ca. 30 cm longo, cum rachi costisque (subtus) spinis carnosis apice paleas ferentibus subaspero; paleis lanceolatis brunneis, marginibus ebeneis sclerenchymaticis dentatis. Lamina 45 cm longa 25 cm lata, ovata, firmiter herbacea, pinnata, apice lato lobata. Pinnis liberis 10-jugis, alternis, infimis 4 cm inter se remotis, brevissime petiolatis, superioribus sessilibus, late oblongis, ad 12 cm longis 4 cm latis, apice abrupte angustato acutis, basi truncatis s. subcordatis, lobatis. Lobis contiguus vel saepe imbricatis, subquadratis, ca. 1 cm longis latisque, truncatis, angulo posteriore rotundato anteriore recto acuto, integris. Pagina superiore glaberrima, inferiore ad costas et venas majores paleis iis rachidis similibus sat dense vestito, paleis majoribus stipitatis minoribus sessilibus. Venis 6—7-jugis, adscendentibus, 2—3-jugis ad sinum conniventibus, plerisque liberis rarius unitis, nonnullis furcatis. Sori pro lobo 3—4-jugis, basali anteriore longissimo, diplazioideo, indusiis angustis, integris, brunneis.

Borneo: Sarawak, Baram district, Kimanis limestone caves, south of Kayan river, May 1926, E. Mjöberg. (Type in Herb. Selim Birger, now Riksmuseum, Stockholm).

A very peculiar species, in general aspect resembling *D. proliferum* and ex descr. *D. permirabile* v. A. v. R. Bull. Jard. Buit. III. 5: 196 c. fig. from Sumatra. This has the same remarkable scales seated on the tips of fleshy spines on rachis and costæ beneath and with thick black toothed edges, but all veins of *D. permirabile* are anastomosing, in *D. Birgeri* normally free. *D. crinitum* (Bak.) C. Chr. has similar scales but it is bipinnate.

**Diplazium supranitens** C. Chr. sp. n. — Rhizomate? stipite ad 35 cm longo, basi nigrescente et paleis castaneis lanceolatis sat dense vestito, sursum ut rachi brunneo-stramineo, nudo glabroque. Lamina late lanceolata, ad 70 cm longa supra basin 25 cm lata, herbacea, superne atroviridi nitida, inferne pallidiore opaca, pinnata, versus apicem pinnatifidum sensim attenuata. Pinnis usque ad 30-jugis, 4—2 cm inter se remotis, alternis, patentibus, falcatis, lanceolatis, maximis ad 15 cm longis 1—1.2 cm latis, longe acuminatis, infimis parum brevioribus saepe reflexis, fere omnibus petiolatis (petiolo 2—3 mm longo), basi subaequaliter truncatis, saepe auriculatis, marginibus regulariter serrulato-lobatis; lobis obliquis, ca. 3 mm longis basi 4—5 mm latis, antrorsim acutis, levissime dentatis vel integris. Venis in lobis pinnatis, ca. 5. Sori plerumque venas basales acroscopicas solum occupantibus, diplazioideis, ab costa fere ad sinum curvatim extensis, rarius 2—4 pro lobo, ceteris asplenioideis; indusiis pulchre rufo-brunneis, integris.

Borneo: Sarawak, Telok Tambak, March 14th, 1914. Native collector of the Sarawak Museum no. 83. (Type in Herb. C. Chr.).

A new species of the group of *D. silvaticum* Sw. marked by the glossy varnished-like upper surface and the reddish indusia.

**Dryopteris berastagensis** C. Chr. sp. n. — *Cyclosorus* affinis *D. moulmeinensis* (Bedd.) C. Chr. et *D. megaphyllae* (Mett.) C. Chr., major, pinnis profundius incisis, utrinque verruculosus, venis infra indusiisque longe albido-pilosis.

Rhizomate stipiteque? Rachi valida, griseo-straminea, versus apicem solum pubescente. Lamina verisimiliter ad 1 m longa, pinnata apice pinnatifida, herbacea. Pinnis suboppositis, in excrescentiis tuberculiformibus rachidis sessilibus, 8 cm inter se remotis, subhorizontalibus, oblongis, 25 cm vel ultra longis, 4—5 cm latis, basi subito contractis et subaequaliter breve cuneatis, apice breviter acuminatis,  $\frac{1}{4}$ — $\frac{1}{3}$  viae ad costam lobatis, lobis densis, obliquis, oblongis, 6—8 mm longis et latis, postice rotundatis antice rectis, subacutis, extus saepe repandulis, marginibus cartilagineis incrassatis; paginis utrisque dense verruculosus nec glandulosus, superiore, costa sparse strigosa excepta, glabra, inferiore ad costam costulas venasque pilis longis albidis deciduis sparsis hirtis. Venis ca. 10-jugis, curvatim adscendentibus, inferioribus 2—3-jugis alternatim anastomosantibus, sequentibus 3—4-jugis ad membranam angustam conniventibus. Soris medialibus, indusiis subpersistentibus, centro pilis albidis dense hirtis; sporangiis glabris.

Sumatra: Berastagi, East Hills, coll. H. N. RIDLEY 1921. (Type in Kew).

This is perhaps the same as *D. megaphylla* v. A. v. R. Mal. Ferns Suppl. 180, which, however, is not the true *D. megaphylla* (Mett.) (*Aspidium pennigerum* Bl., t. spec. auth. 1. BLUME). Our plant differs in its much larger pinnæ, which are verrucose on both sides and long-hairy but not glandular beneath, at base equally cuneate, not evenly truncate. Whether the lower pinnæ are reduced to auricles as in *D. megaphylla* or not is uncertain because of the missing stipes.

**Dryopteris bungsensis** C. Chr. sp. n. — *Cyclosorus* rhizomate erecto, elongato, paleis lanceolatis, brunneis, integris vestito. Stipite folii sterilis 17, fertilis 30 cm ad pinnae evolutas infimas longo, brunneo, paleis parvis ubique sed decidue onusto, sursum minute puberulo, fere ad basin tuberculis multi-jugis (pinnis abortivis) distantibus instructo. Lamina sterili late lanceolata, acuminata, 45 cm longa 16 cm lata, firmiter herbacea, superne nitida subtus opaca, subbipinnatifida; rachi tereti, pilis atrobrunneis, nitidis, adpressis ubique dense hirta. Pinnis (praeter abortivas) ca. 20-jugis, alternis, sessilibus, 2 cm inter se remotis, infimis 1—3-jugis valde reflexis, paulo abbreviatis, inframedilibus maximis, 7 cm longis 1.5—2 cm latis, recte patentibus, oblongis, basi truncatis et paulo angustatis, apice integro sat subito breviter acuminatis, ad  $\frac{1}{3}$ — $\frac{1}{4}$  pinnatifido-lobatis, superioribus subintegris; lobis oblongis vel subquadratis, 2.5 mm latis, subfalcatis, truncatis, antroisim acutis; venis 4-jugis, basalibus unitis; costis utrinque densissime antroisim strigosis, venis et parenchymate pilis brevibus adpressis sparsius utrinque

hirtis. — Lamina fertili ad 50 cm longa 10 cm lata, pinnis 5 cm longis 1 cm latis, recte horizontalibus, infimis non reflexis. Soris sat magnis, costulis valde approximatis, rotundis, indusiis reniformibus, brunneis, dense pilosis, subpersistentibus, sporangiis glabris.

Borneo: Sarawak, Bungo Range, alt. 1000 ft., April 1909, C. J. BROOKS no. 10. (Type in Brit. Mus. Nat. Hist.).

Near *D. arida* and *D. stipellata*, best marked by the costular sori, the large number of abortive pinnae along the stipes nearly to its base and the very reflexed lower pinnae of the sterile frond, as also by the somewhat dimorphic fronds.

*Dryopteris cyclopeltidiformis* C. Chr. sp. n. — Plate VI, fig. 3—4. — *Eudryopteris* rhizomate (verisimiliter erecto), stipite 40 cm longo, fusco, ad basin dense paleaceo, paleis lineari-lanceolatis, fuscis, integris, sursum ut rachi paleis piliformibus fuscis fibrilloso. Lamina 30 cm longa 15 cm lata, laete viridi, firmiter herbacea, pinnata apice pinnatifida. Pinnis alternis 6—8 cm longis 1 cm latis, inferioribus (vix vel paulo abbreviatis) 1—2 mm petiolatis, basi aequaliter cordatis, subbiauriculatis, breviter acuminatis, inaequaliter serrulato-crenatis, dentibus triangularibus, obliquis; costis subtus sparse fibrillosis; venis luce transiente solum visibilibus, lateralibus flexuosis, venulis 3-jugis, omnibus brevibus, in parenchymate terminantibus. Soris bi-subtriseriatis, in venulis submedialibus, indusiis parvis, peltatis, brunneis, mox delapsis.

Hainan: Five Finger Mountain, in damp jungle, alt. 6000 ft., Mrs. ERYL SMITH no. 1633. (Type in Herb. Univ. California, Berkeley).

In most characters and habit very like *D. decipiens* (Hook.) O. K., differing by the lack of bullate scales and especially by the short veins.

*Dryopteris Endertii* C. Chr. sp. n. — Plate V, fig. 7—10. — Filix magna, acaulis (ex schedula), rhizomate? stipite valido, fere 1 cm crasso, 80 cm longo, basi atro-brunneo sursum (ut rachi) stramineo, nudo, glaberrimo, superne sulcato. Lamina deltoidea, ad 1 m longa, 50 cm vel ultra lata, coriacea, laete viridi, bipinnata, rachi sursum profunde sulcata et dense breviter griseo-puberula. Pinnis oppositis, 9—5 cm inter se remotis, 12—14-jugis, lanceolatis, acuminatis, inferioribus 35 cm longis, 8 cm latis, versus basin plus minusve angustatis, petiolo 3 cm longo stipitatis, pinnatis, tertia parte apicali profunde pinnatifidis, costa ut rachi breve puberula et paleis parvis perpaucis angustis praedita; pinnulis liberis ad 15-jugis, suboppositis vel subalternis, subsessilibus, 2 cm inter se remotis, lanceolatis, breve acuminatis, versus basin truncatam angustatis, 5 cm longis 1 cm latis — basalibus plus minusve, saepe valde abbreviatis —, recte patentibus, dimidia parte basali pinnatifido-lobatis sursum crenatis vel integris, iis pinnarum superiorum atque segmentorum integris, utrinque glaberrimis. Costulis venisque subtus prominulis, crassis, venulis 1—2-jugis, oppositis, basalibus 0.5 mm supra costulam e vena mediana egredientibus, valde adscendentibus, cum margine crassiuscula confluentibus, ad sinum inter lobos conniventibus, interdum apicibus unitis, iis pinnularum minorum segmentorumque plerisque

simplicibus. Soris medialibus, parvis, exindusiatis, sporangiis paucis, glabris, pilis paucis intermixtis.

Dutch Borneo: W. Koetai, Kemoel, alt. ca. 1850 m., Oct. 20th, 1925, F. H. ENDERT no. 4433. (Type in Herb. Buitenzorg).

A remarkable species of doubtful relationship. In general aspect it resembles more a tree-fern than any species of *Dryopteris*, but the sporangia are not cyatheoid. In spite of the tendency to cyclosoroid venation the species has certainly nothing to do with the subgenus *Cyclosorus* but perhaps with *Lastrea*. I do not know any Malayan fern comparable with this, but it has a superficial resemblance to the American *D. pteroidea* (Kl.) C. Chr.

*Dryopteris foliosa* C. Chr. sp. n. — *Polystichopsis* rhizomate? Stipite gracili, stramineo, ad 40 cm longo, paleis anguste lanceolato-auminatis, in pilum terminantibus, luteo-brunneis, mollibus, integris, ad 1 cm longis basi dense sursum sparse vestito, ut toto folio pilis glandulisque omnino destituto. Lamina ovata, 25—30 cm longa basi 15 cm lata, acuminata, herbacea, bipinnata, basi tripinnata, divisione anadromica; rachi gracili, subflexuosa, paleis perangustis, linearibus, pallidis, deciduis vestita. Pinnis 8—9-jugis, alternis, inferioribus 6—7 cm inter se remotis, plerisque arcuatim adscendentibus, acuminatis, basalibus maximis, 15 cm longis, petiolo 1—1.5 cm longo stipitatis, latere basiscopico producto plus minusve inaequilateralibus, subbipinnatis, sequentibus sensim minoribus, pinnatis-pinnatifidis, aequilateralibus, superioribus pinnatifidis; pinnulis (II. ord.) basalibus pinnarum basium maximis, breve petiolulatis, basiscopica 7—8 cm longa, basi pinna 4 cm lata, acroscopica 4—5 cm longa, 2.5—3 cm lata, subpinnata, sequentibus profunde pinnatifidis, 6—7-jugis, subaequalibus, superioribus in alam ad costam decurrentibus, serratis. Pinnulis ultimis (II. vel III. ord.) subtrapezoideis, acutis, postice basi cuneatis et plus minusve decurrentibus antice subauriculatis, plurimis 2—3 cm longis basi 1.5 cm latis, maximis profunde pinnatifidis, minoribus serratis; lobis oblongis, 3—5 mm latis, obliquis, contiguis, serratis, dentibus mucronatis; costis venisque paleis parvis, linearibus vel nonnullis subbullatis, pallide luteis sparse onustis; venis distinctis, in segmentis pinnatis, interdum furcatis, valde obliquis, paucis. Soris parvis, remotis, inter costulam et marginem segmentorum submedialibus, utrinque uniseriatis, in venis in parenchymate terminantibus subterminalibus, venis sterilibus in dentes excurrentibus; indusiis subpersistentibus, atro-brunneis, peltatis.

British East Africa: Mt. Kinangop, 2350 m., in forest, Febr. 17th, 1912, Ch. ALLUAUD no. 255 — (Type in Herb. C. Chr.).

Closely related to *D. Webbiana* (A. Br.) C. Chr. from Madeira, but scales lighter and the frond less incised with much broader secondary pinnæ and thinly herbaceous. In general habit also resembling the West-Indian *D. chaerophylloides* C. Chr. but hairless.

*Dryopteris glanduloso-lanosa* C. Chr. in HERRERA: Chloris Cuzcoensis 134. 1926 (nomen). — *Lastrea* rhizomate? Stipite valido, 5 mm crasso, ad



auriculas infimas 1 m longo, basi nigrescente sursum brunneo-stramineo, glabro. Lamina lanceolata, utrinque attenuata, 1 m vel ultra longa, medio 20—30 cm lata, coriacea, laete viridi, bipinnafida; pinnis oppositis, 2—3 cm inter se remotis, sessilibus, lanceolatis, maximis (medialibus) 10—12 cm longis 1.2—1.3 cm latis, longe acuminatis, fere ad costam pectinato-pinnatifidis, infimis auriculiformibus et praeterea 5—6-jugis distantibus rudimentariis tuberculiformibus. Laciniis patentibus, integris, obtusis, marginibus revolutis false acutis, basali basiscopica interdum paulo longiore. Venis indivisis, densis, 10—12-jugis. Soris supramedialibus, saepe margine revoluti tectis, indusiis persistentibus, laete brunneis, densissime hirtis et glandulosis, sporangiis glabris. Lamina tota (rachi superficiebusque) glandulis luteis sessilibus parvis dense glandulosis; rachi quadrangulati straminea, costis venisque subtus dense lanoso-pubescentibus, pilis mollibus, albidis, pluricellularibus, costis costulisque superne pilis sparsis brevibus instructis.

Peru: En el borde de un camino, Prov. de Quispicanchi, distrito de Huasao, 3300—3400 m, F. L. HERRERA, may 1925, no. 214. (Type in U. S. Nat. Herbarium).

A most distinct species, somewhat resembling *D. cheilanthoides* (Kze.) C. Chr., but by its dense lanose pubescence and glandulosity quite unique.

**Dryopteris Handeliana** C. Chr. sp. n. — Plate VI, fig. 5—6. — *Eudryopteris* e grege *D. hirtipedis* rhizomate erecto, cum basibus stipitum dense paleaceo, paleis fuscis, ovato-lanceolatis, integris Stipite 10—15 cm longo, laete brunneo, decidue paleaceo, mox nudiusculo et, paleis delapsis, asperulo. Lamina lanceolata vel oblanceolata, ca. 25 cm longa 8—9 cm lata, acuminata, versus basin paulo angustata, lutescenti-viridi, firmiter herbacea vel subpapyracea, pinnata apice pinnatifida; rachi paleis lanceolatis brunneis integris vel parce laceratis sat dense vestita. Pinnis 18—20-jugis, sessilibus, alternis, inferioribus plus minusve abbreviatis (basalibus interdum 2 cm longis) subdeflexis, sequentibus horizontalibus, 2 cm inter se remotis, basibus subcontiguis, maximis 4.5—5.5 cm longis basi 1.5 cm latis recte truncatis, breve acuminatis, serratis, dentibus falcatis, subspinescenti-acutis, vix ultra 1 mm longis; costis stramineis, subtus minute paleaceis, paginis glaberrimis. Venis densis, crassis, pallidis, semel vel bis furcatis. Soris biseriatis, intramarginalibus, sat parvis, indusiis persistentibus, rufis, integris.

China: Yunnan, pâturages de San-chan, alt. 800 m. E. E. MAIRE. (Type in Herb. C. Chr.).

This is in its general aspect a very distinct species, peculiar by the sori forming a band of two rows all round the edges of the shallowly serrate pinnæ, the whole leaf thus resembling *Microlepia Hookeriana*; as in other species of the group the lower pinnæ are sterile. The species is certainly very near *D. Dickinsonii*. It is dedicated to Dr. HANDEL-MAZZETTI, Vienna, who some years ago sent to me for determination a very large collection of Yunnan ferns made by the Rev. E. E. MAIRE. I fear that I have named several duplicates "*Mazzettiana*".

*Dryopteris ignapensis* C. Chr. sp. n. — *Goniopteris* exindusiata rhizomate erecto breve, apice paleis castaneis parvis stellatim puberulis sat sparse vestito. Stipitibus fasciculatis numerosis, usque ad 35 cm longis, pilis ramosis brevissimis sparse puberulis. Lamina lanceolata, 30—45 cm longa 8—10 cm lata, atro-viridi, herbacea, basi vix angustata versus apicem lobatum acuminatum saepe longe attenuata, pinnata; rachi pilis ramosis simplicibusque breve puberula, infra apicem 1—2 gemmas proliferantes gerente. Pinnis ad 20-jugis, alternis, subsessilibus, subhorizontalibus, 3—2 cm inter se remotis, late lanceolatis, breviter acuminatis vel acutis, integris vel plus minusve crenatis, inferioribus ad basin inaequaliter truncatam angustatis, superioribus aequaliter truncatis interdum biauriculatis, glaberrimis vel costis subtus solum minute puberulis. Venulis 3-jugis, more *Goniopteridis* unitis, basalibus ca. 1 mm supra costam e costula egredientibus; soris exindusiatis, in venulis subapicalibus, duobus oppositis saepe confluentibus; sporangiis glabris.

Brasilia: Prov. São Paulo, Morro das Pedras, Mun. de Ignape, A. C. BRADE, 1922, no. 8232. (Type in Herb. C. Chr.).

Dr. BRADE sent me beautiful specimens of this *Goniopteris* supposing it to be specifically different from *D. vivipara* (Raddi) C. Chr., with which it has been confounded. It resembles that species in its nearly or quite entire pinnæ with the rows of sori remote from the midrib, but the pinnæ are smaller and much more numerous and the long narrow leaf is not imparipinnate but through a number of diminishing pinnæ terminating into a pinnatifid apex, thus in general habit recalling the bipinnatifid *D. gemmifera* Hieron. The leaves are somewhat dimorphous, the sterile ones with shorter stipes and more close-placed pinnæ. *D. riograndensis* Lindm. is smaller with lobed pinnæ.

*Dryopteris Jenseniae* C. Chr. sp. n. — *Ctenitis* e sectione *D. protensae* rhizomate repente, paleis castaneis angustis integris vestito, mox nudo. Stipite atrobrunneo, nitido, glaberrimo, paleis linearibus castaneis persparse instructo, ad 45 cm longo. Lamina late deltoidea, 50 cm vel ultra longa, atro-viridi, herbacea, bipinnata vel subtripinnata, sursum bipinnatifida, apice pinnatifida; rachi subtus brevissime rufo-velutina et paleis linearibus perparvis hinc inde instructa. Pinnis liberis ca. 8-jugis, inferioribus 14 cm inter se remotis, alternis, infimis maximis, 30 cm vel ultra longis, petiolo 4—5 cm longo stipitatis, latere basiscopico valde producto inaequalateralibus, acuminatis, pinnulis earum 10—11-jugis, 4—3 cm inter se remotis, brevissime petiolulatis, acuminatis, alternis, basali basiscopica lanceolata, 15 cm longa 5 cm lata, basi pinnata sursum fere ad costulam pinnatifida, sequentibus sensim brevioribus, minus profunde incisis, acroscopicis subaequalibus, ca. 8 cm longis 3 cm latis,  $\frac{1}{2}$ — $\frac{2}{3}$  pinnatifidis, superioribus grosse serrulatis; pinnis sequentibus breve petiolatis, aequalateralibus, 2—3-jugis pinnatis, ceteris minus incisis, pinnulis acroscopicis pinnarum basaliū similibus; segmentis (vel pinnulis III. ord.) basi decurrentibus approximatis, obliquis, oblongis, rotundato-obtusis, integris vel repandulis, plerisque 8—10 mm latis, maximis (liberis) 3 cm longis. Costis superne glabris, inferne sat dense rufo-

velutinis, paginis utrisque glaberrimis, eglandulosis. Venis distinctis, liberis, adscendentibus, remotis, 3-jugis, marginem non attingentibus, indivisis, raro furcatis. Soris inter costulam et marginem medialibus, remotis, sat parvis, indusiis persistentibus, reniformibus, brunneis, glabris; sporangiis glabris.

Tropical Africa: Belgian Congo, Dibele Territory, Sankuru, Pania-Dibele-Bulumbu Bena, by river, Nov. 10th, 1922, Mrs. J. M. JENSEN no. 65. (Type in Herb. C. Chr.). — Same district, between Osovo and Afumbu (Mrs. JENSEN no. 44). A third specimen, collected by Mrs. JENSEN in the forest between Gangwe and Yembe, 1923, no. 6, belongs probably to the same species, differing from the type in the segments being abruptly acute to acuminate.

A splendid member of the group of *D. protensa* (Afz.) C. Chr., which is represented in tropical Africa by a considerable number of confusing forms. Our new species, in general appearance wholly tectarioid, is much larger than any other form known to me, at least the type described above. This large form is according to Mrs. JENSEN common near rivers, but the same species occurs also in the forest but is there much smaller; no. 44 quoted above is such a smaller form closely approaching *D. protensa* var. *fraterna* (Mett.) C. Chr. but different by the quite glabrous surfaces, the costæ and costules only being extremely short-tomentose beneath.

The specimens were found in a collection of ferns and other plants made at my request by Mrs. JENSEN while accompanying her husband Mr. J. M. JENSEN, Commissaire de district during his political and ethnographical mission 1922–24 to the central regions of Belgian Congo.

*Dryopteris kiauensis* C. Chr. sp. n. — *Cyclosorus* rhizomate? stipite valido, usque ad 1 m longo, brunnescente, glabro, superne trisulcato, paleis fuscis, angustis, integris sparse praedito, mox nudo. Lamina late lanceolata, ca. 1 m longa, subcoriacea bipinnatifida, rachi glabra; pinnis numerosis, alternis, 6–4 cm inter se remotis, breve (1 mm) petiolatis, linearibus, maximis 15–18 cm longis, 1.2 cm latis, acuminatis, basalibus vix brevioribus(?) praeter costas superne breve et dense griseo-puberulas glaberrimis, ad alam 1.5 mm latam pinnatifidis; segmentis recte patentibus, oblongis, integris, apice rotundatis, planis, ca. 2 mm latis, inferioribus sensim abbreviatis; venis indivisis, indistinctis, 8–10-jugis, obliquis, basalibus ad sinum rotundatum conniventibus vel interdum apicibus unitis. Soris sat magnis, subcostularibus, globosis, contiguis, exindusiatis(?); sporangiis pallidis, glabris.

Dutch Borneo: W. Koetai, Kiau, alt. ca. 700 m., Oct. 20th, 1925, F. H. ENDERT no. 4433 (type in Herb. Buitenzorg).

Nearest *D. contigua* Rosenst. with a similar lax venation (basal veins free or occasionally united), but practically glabrous, texture much firmer, the veins obscure, hidden in the thick parenchyma; the sori cover almost the whole underside of the segment and are apparently exindusiate.

*Dryopteris moluccana* C. Chr. sp. n. — Syn. *Polypodium erubescens* var. *amboynensis* Hook. et Bak. Syn. Fil. 306). — *Cyclosorus* rhizomate per-

crasso, decumbente, (repente?), stipite incompleto basi 1 cm vel ultra crasso, atrobrunneo, paleis brunneis opacis sparse vestito, sursum brunneo-stramineo, glabro. Lamina 1 m vel ultra longa, herbacea, bipinnatifida, rachi glabra; pinnis suboppositis, 6—3 cm inter se remotis, maximis 30 cm vel ultra longis 3 cm latis (basalibus brevioribus), acuminatis, inferioribus versus basin in petiolum cuneatim alatum angustatis, superioribus sessilibus, basi vix angustioribus, omnibus ad alam 1.5 mm latam pinnatifidis; laciniis numerosissimis, parum obliquis vel subfalcatis, integris, planis, acutis vel obtusis, 1.5 cm longis 2—2.5 mm latis; venis simplicibus, 17—20-jugis, basalibus ad sinum conniventibus et membrana cartilaginea separatis; paginis praeter costas superne minutissime glanduloso-puberulas pilis utrinque destitutis, sed inferiori glandulis sessilibus nitidis instructa. Soris medialibus, parvis, exindusiatis(?), sporangiis glabris, glandulis intermixtis.

Amboina, leg. H. O. FORBES 1882, no. 3273 (typus in Herb. Berol.), Batjan: Sibella, WARBURG no. 17824.

In spite of a certain resemblance in habit to *D. erubescens* to which HOOKER and later CHRIST referred this large species it has nothing to do with that species, but is very closely allied to *D. extensa* (Bl.) O. K. and *D. logavensis* (should be *logavengensis*) Rosenstock, Fedde, Rep. 10: 332. 1912, both of which are indusiate and with the basal pair of veins truly united. I have seen no indusium but it is very probable that the young sori are furnished with small indusia.

**Dryopteris peltoclamys** C. Chr. sp. n. — *Cyclosorus* rhizomate? Stipite ad 60 cm longo, virescente stramineo, minute puberulo mox glabro. Lamina late ovata, 50 cm longa 25—30 cm lata, herbacea, laete viridi, minute verruculosa, impari-pinnata; pinnis auriculiformibus unijugis, ca. 12 m ab infimis evolutis remotis, evolutis 6-jugis, 9—6 cm inter se remotis, alternis, inferioribus breve petiolatis, oblongis, ca. 18 cm longis 4 cm latis, longe acuminatis, basi oblique truncatis vel inferioribus versus basin magis rotundato-cuneatam parum angustatis, marginibus cartilagineis serratis, dentibus basi 5 mm latis 2 mm altis, falcatis; pinna terminali simillima; tota lamina praeter costas costulasque subtus inconspicue puberulas glaberrima. Costulis ca. 5 mm inter se remotis, venis 10-jugis, omnibus alternatim unitis. Soris medialibus, indusiis magnis, peltatis vel sinuatis, orbicularibus, permembranaceis, pallidis, integris, totum solum arcte tegentibus, centro parce pilosis: sporangiis glabris.

Java orientalis: Tanggore, l. C. W. FRANCK 1924 (Type in Herb. C. Chr.).

In size and habit very like *D. urophylla* which is exindusiate; also resembling *D. megaphylla* but distinctly impari-pinnate with different teeth and indusia; most of these seem to be peltate without sinus but others are nearly reniform with a very narrow sinus.

**Dryopteris plumosa** C. Chr. sp. n. — *Lastrea* rhizomate non viso, sine cubio erecto. Stipite 6—10 cm longo, basi castanea paleis rufis, lanceolato-acuminatis, integris dense vestito, sursum parcius squamoso. Lamina lanceo-

lata, ca. 20 cm longa, medio 3—4 cm lata, utrinque angustata, subcoriacea, laete viridi, bipinnatifida. Pinnis numerosis, alternis, vix 1 cm inter se remotis, sessilibus, fere omnibus deflexis pendentibus, medialibus maximis, 2—3 cm longis 8 mm latis, acutis, inferioribus paulo abbreviatis, abortivis nullis, ad costam fere pinnatifidis. Laciniis subpatentibus, sinubus rotundatis separatis, integris, acutis, marginibus revolutis, basi ca. 1 mm latis, basalibus plerumque aequalibus. Venis 3—4-jugis, indivisis, basali anteriori solum sorifera, rarius 2—3 soris pro lobo, supramedialibus; indusiis parvis, mox delapsis, pallidis, glandulosis, sporangiis glabris. Rachis straminea, dense molliter villosa, lamina utrinque glandulis aureis vel rubinis dense glandulosa, superne ad costas molliter sed sat sparse villosa, subtus ad costas pilis albidis paucis instructa.

Borneo: Sarawak, summit of Mt. Murud, alt. ca. 2700 m, E. Mjöberg, 1923. (Type in Herb. C. Chr.).

A well-marked small species of pronounced alpine habit, like a feather with the closely set pinnæ nearly all pendent.

**Dryopteris tibangensis** C. Chr. sp. n. — *Cyclosorus* rhizomate erecto, breve, paleis lanceolatis, castaneis, hirtis ciliatisque vestito. Stipite 10—20 cm longo, breviter pubescente. Lamina lanceolata, 15—20 cm longa 6—8 cm lata, firmiter herbacea, bipinnatifida apice pinnatifida, basi non reducta; rachi pilis griseis, patentibus dense hirta. Pinnis alternis, 3—2 cm inter se remotis, 8—10-jugis, subdeltoideis et subfalcatis (basalibus vix abbreviatis saepe deflexis), maximis 4 cm longis 1 cm latis, acutis, plerisque breviter petiolatis, basi truncatis, ca. ad medium pinnatifidis; lobis subfalcatis, deltoideis, 2—2.5 mm latis, integris, acutis, basali acroscopico paulo producto; venis 5—6-jugis, inferioribus 2-jugis unitis. Soris medialibus, indusiis parvis, brunneis, dense hirtis, sporangiis paucis, glabris(?). Pagina superiore pilis brevibus, rigidis sat sparse hirta, inferiore dense hirsuta — pilis costarum venarumque longis, patentibus, albidis, parenchymatis erectis, brevioribus — et ad venas glandulis ochraceis vel rubris, globosis ornata.

Dutch Borneo: Mt. Tibang, 14—1700 m., Oct.—Dec. 1925, E. Mjöberg. (Type in Herb. C. Chr. et in Herb. Selim Birger, Riksmuseum, Stockholm).

Closely related to *D. pilosiuscula* (Zipp.) C. Chr. from Java and Sumatra, but the larger pinnæ are distinctly stalked, the upper side less strigose, the under side much more densely hirsute and the pinnæ incised nearly half-way down.

**Elaphoglossum lepidopodum** C. Chr. sp. nov. — Rhizomate brevi, crasso, paleis laete-brunneis opacis tenuibus ovato-lanceolatis acutis sparse dentato-fimbriatis ad 1.5 cm longis 4 mm latis dense vestito. Foliis caespitosis, stipitibus crassis, rigidis, basi non articulatis, cum parte basali costae paleis rhizomatis similibus densissime obtectis. *Folii steriles* stipite 4—5 cm longo, lamina oblonga, 12—20 cm longa 2.5—3 cm lata, basi apiceque rotundata, coriacea, laete viridi, costa pallida, valida, subtus prominente, marginibus cartilagineis, pallidis, paleis lanceolatis laceratis vix ultra 0.5 mm



longis dense ciliatis, pagina superiori paleis minutis conspersa (aetate nuda), inferiori paleis peltatis parvis luteo-brunneis stellato-laceratis vel e basi lacerata lanceolatis sat dense onusta. Venis subdistinctis, plerisque furcatis, apice cum marginem cartilagineam junctis. — *Folii fertilis* stipite 12 cm longo, lamina sterili aequali vel ad basin magis attenuata.

Formosa: Shinsuiei, Prov. Taito, M. OGATA, July 4th, 1935, no. 60. (Type in Herb. C. Chr., received from Prof. OGATA as *E. latifolium*).

A very fine species, only to be compared with *E. austrosinicum* Christ from Kwangtung, which it resembles in vestiture and texture; it differs in its broadly rounded apex and rounded base of the lamina, in the densely fringed margins (hereby not unlike *E. Cumingii* (*E. Elmeri* Cop.)) and the much denser and larger scales of the under side, also in the prominent costa. The blade of *E. austrosinicum* is acute and long attenuate below, the margins naked. The dense marginal scales in our species are sited inside of but protruding beyond the narrow cartilagineous margin. By the densely chaffy stipe the species recalls the American *E. decoratum*.

**Elaphoglossum Ogatai** C. Chr. sp. nov. — Rhizomate late repente, ca. 3 mm crasso, paleis tenuibus laete luteo-brunneis opacis ovatis vel acutis subintegris 1—1.5 mm latis imbricatim vestito, mox nudo. Stipitibus distantibus, gracilibus, ad phyllopodia nigra 1 cm alta articulatis, stramineis, paleis iis rhizomatis similibus deciduis laxe vestitis. Foliis magnitudine valde diversis: folio sterili maximo: stipite 16 cm longo, lamina 15 × 4.5 cm, minimo: stipite 3 cm, lamina 4 × 1 cm. Lamine lanceolata vel majoribus ovato-vel elliptico-lanceolatis, apice acuta, basi rotundata vel breviter cuneata et in stipitem breviter decurrente, herbacea, laete-viridi, marginibus membranaceis albidis pellucidis, paginis (praesertim inferiori) paleis castaneis minutis punctatis, costa tenui straminea paleis paucis iis stipitis similibus subtus onusta; venis subangulo 45° e costa egredientibus, distinctis, plerisque furcatis, intra marginem membranaceam 0.5 mm latam distincte clavatum incrassatis. Foliis fertilibus similibus, stipite longiori, lamina 6—7 cm longa 1.5—2 cm lata.

Formosa: Mt. Arisan, M. OGATA, July 14th, 1935, no. 59. (Type in Herb. C. Chr., received from Prof. OGATA as *E. laurifolium*).

Certainly not *E. laurifolium* (Thouars) Moore, a species from Tristan d'Acunha and presumably the same as *E. conforme*, nor the Malayan fern by CHRIST and v. A. v. R. called *laurifolium*, which is *E. commutatum*, but it is extremely like *E. angulatum* (Bl.) Moore. BLUME's figure (Fl. Javæ pl. 6) could very well illustrate our species, which differs, however, in its remarkably thin texture and the distinctly but shortly decurrent lamina.

**Gleichenia barbula** C. Chr. sp. n.

Rhizomate? Stipite valido, brunneo, nudo, verisimiliter 50 cm vel ultra longo, stricto; ramis primariis oppositis, pluries (4—5) furcatis, axibus 1.—3. (vel 4.) ordinis pinnulis destitutis, adscendentibus, primum paleis squarrosis albidis, lanceolato-filiformibus barbatis, paleis majoribus ramorum juveniliu cito deciduis, basi solum breve ciliatis sursum integris

minoribus axium 3.—4. ordinis dense ciliatis; internodio 1. ord. 6, 2. ord. 8, 3. ord. 2 cm longo, axibus penultimis (4. vel 5. ord.) pectinato-pinnatis, segmentis inferioribus valde reductis; ramis (pinnis) ultimis (5. vel 6. ord.) adscendentibus, flabellatim ordinatis, 15 cm longis, 1—1.5 cm latis, acuminatis, pectinato-pinnatifidis, costa superne floccoso-paleacea inferne tereti paleis numerosis recte patentibus anguste lanceolatis, griseis densissime ciliatis vestita; segmentis obliquis, coriaceis vix glaucis, nudis, basi dilatatis ca. 2 mm latis, apice acutis et levissime crenatis, costulis validis, purpurascens, venis obscuris, furcatis. Soris paucis, medialibus, superficialibus, sporangiis 5—6, stellatim ordinatis.

Dutch Borneo: W. Koetai, Kemoel, 1800 m., Oct. 22nd, 1925, F. H. ENDERT no. 4500. (Type in Herb. Buitenzorg).

A distinct species related to *G. hirta* Bl. and near to *G. amboinensis* v. A. v. R. from Amboina and *G. ornamentalis* Ros. from New Guinea, which probably are forms of one species; from this our species differs by its proportionally long axes, by the ultimate segments being quite naked and by the fan-shape of the last branches.

*Lindsaya trimarginata* C. Chr. sp. n. — *Eulindsaya* rhizomate breve repente, foliis numerosis, usque ad 50 cm longis, glaberrimis, stipite ad pinnis infimas 4—5 cm longo, atro-castaneo, trigono, angulis angustissime marginatis; lamina lineari-oblancoolata, supra medium 2.5 cm lata, pinnata, herbacea, laete viridi; rachi atro-castanea, trigona, facie superiore plana, angusta, angulis brunneo-marginatis vel sursum potius alatis, lateribus plus minusque convexis, angulo inferiore cariniformi, anguste marginato. Pinnis multijugis, sessilibus, ad rachin articulatis, dimidiatis, triangularibus, maximis 12—13 mm longis, basi 7 mm latis, latere inferiore recto, superiore 3—4-lobato, apice oblique truncato rarius acuto, inferioribus sensim minoribus, infimis minimis distantibus, superioribus saepe imbricatis; lobis vix 1 mm longis, 2—2.5 mm latis, recte truncatis; venis liberis. Soris 3—5 pro pinna, uno pro lobo, 4—6 venas occupantibus, 2—4 mm longis, indusio angusto, marginem attingente, leviter crenato.

Philippine Islands: Luzon, Paracale, Camarines province, M. RAMOS & G. EDANO, Nov.—Dec. 1918, Bureau of Science no. 33778. (Type in Herb. Berol.). — Sorzogon province, H. M. CURRAN, June 1908, Bur. of Sci. 12251.

Both specimens were distributed as *L. adiantoides* J. Sm. which is *L. humilis* Kuhn and very different from *L. adiantoides* (Bl.) Kuhn. They resemble certainly *L. humilis*, the valid name of which must be *L. adiantoides* J. Sm. 1841 (nomen), Hook. sp. 1: 204 pl. 61 C. 1846, but are very much larger, and no description of *L. humilis* mentions the trigonous stipe and rachis with all three angles furnished with a membranous brown wing, which grow broader upwards. In this character our species is remarkably alike *Asplenium trialatum* described above.

*Oleandra vulpina* C. Chr. sp. n. (*O. colubrina* var. *membranacea* Brause, ENGLER'S Jahrb. 56: 119, non COPELAND). — Rhizomate scandente ramoso, 3 mm crasso, brunneo, longitudinaliter sulcato, paleis rufis, e basi parva

peltata subito in apicem 5 mm longum perangustum vel piliformem patentem contractis, inconspicue ciliatis vel subintegris, basi nec contiguis nec imbricatis. Foliis solitariis, 5—7 cm inter se remotis, phyllopodiis 6—10, stipitibus 3—4 mm longis, ut toto folio ubique molliter griseo-pilosis. Lamina oblanceolata vel spathulata, 12—16 cm longa, versus basin sensim angustata, undulato-sinuata, supra medium ad 5 cm lata, apice subito in cuspidem brevem contracta, tenuiter herbacea; costa subtus densius pilosa cum paleis minimis perpauca, inter pilos fere occultis. Venis simplicibus vel e vera basi furcatis, 14—15 pro centrimetro. Soris irregulariter seriatis, 8—10 cm a costa remotis, parvis, exindusiatis(?).

New Guinea: Near April River, in primæval forest on laterite, 50—60 m. alt., June 18th, 1912, LEDERMANN no. 7652. (Type in Herb. Berol.).

A very distinct and interesting new species with proportionally short but broad, thin, hairy leaves, broadest near the bluntly rounded apex with a short cuspis. I have not been able to detect even traces of indusia, which is rather remarkable. In texture it resembles *O. colubrina* var. *membranacea* Cop. but otherwise quite different in shape, the longer phyllopodia and stipes and chiefly in scale-characters. The hairlike, rufous, squarrose scales of the rhizome are not at all imbricated, their small dilated bases even not contiguous, and when falling they leave the rhizome quite naked. In this feature it resembles *O. Whitmeei* Bak. and its Papuan representative *O. gracilis* Cop. but not in others.

*Platycerium velutinum* C. Chr. sp. nov.

Species ad arbores epiphytica rhizomate breve, paleis lanceolatis, luteo-brunneis, pilis albidis ubique pubescentibus ciliatisque oblecto. Foliis basalibus "nidum" formantibus, brunneis, sat tenuibus, fragilibus, ad 50 cm longis, obovatis vel rotundatis, integris, denique irregulariter fissis, utrinque pilis stellatis brunneis — serius griseis et mox abradis — tomentellis, venis primariis validis, elevatis, pluries dichotomis. Foliis viridibus (geminatis?) subsessilibus, ad 35 cm longis, cuneato-spathulatis, prope apicem late rotundatum, integrum vel irregulariter sinuatum ca. 20 cm latis, versus basin inæqualiter cuneatis (latere interiore concavo, exteriore convexo), in stipitem vix 2 cm longum angustatis. Pagina superiore læte virente, primo pilis stellatis, griseis tenuiter tomentella, alveolata, alveolis (hydathodis) sparsis, parvis, sæpissime massa cretacea impletis, venis primariis solum visibilibus, pluries dichotomis et hinc inde anastomosantibus; pagina inferiore tomento crasso, rufo-brunneo, pilis stellatis formato omnino oblecta, superficie viridi perfecte occulta. Sporangii in parte apicali nascentibus, nec massam confluentem sed secus venas primarias coenosoros distinctos, elevatos, 2—4 cm longos, 0.5 cm crassos, in tomento perfecte occultos formantibus. Sporangii numerosissimis, parvis, annulo 22-articulato; sporis bilateralibus, lævibus.

Congo Belge: Kivu, plaine au Sud du Lac Édouard, vers 1100 m, mai—juin 1929, H. HUMBERT no. 8695. (Type in Mus. Paris).

Evidently related to *P. angolense* Welw. but quite unique by the very dense and thick, rufous tomentum which perfectly conceal the green under

surface, and especially by the sporangia being borne along the primary veins and forming thick, linear, vaulted coenosori, which are covered with tomentum, the sporangia being quite hidden. Whether the sporangia are confined to the veins or some also borne on the epidermis of the parenchyma I cannot say without damaging the only specimen examined.

**Polypodium cavisorum** C. Chr. sp. n. — *Grammitis* rhizomate longe repente, paleis fuscis linearibus, fuscis, clathratis, distincte ciliatis vestito, folia 1 cm inter se remota ferente. Stipite perbreve vel subnullo, raro ad 1 cm longo, lamina anguste lineari-lanceolata, utrinque angustata, usque ad 50 cm longa, 1.5 cm lata, integra vel undulato-repandula, coriacea, laete virente, nervo mediano subtus et marginibus pilis rufo-brunneis brevibus saepe ramosis vel fasciatis sparse onustis mox denudatis, pagina inferiore pilis brevissimis erectis conspersa. Venis occultis, semel vel bis furcatis, ramo basali acroscopico sorifero; soris nervo mediano approximatis, utrinque in parte tertia apicale uniseriatis, profunde immersis, juvenilibus ovalibus, paraphysibus nullis.

Borneo: Sarawak, Ulu Koyen (Mt. Dulit), Baram Valley, ca. 800 m., Sept. 25th, 1932, P. W. RICHARDS no. 2065 (Oxford University Expedition to Sarawak 1932). "Epiphytic on small mossy trees near ground in heath forest". (Type). — Mt. Lingga, coll. by DAYAKS 1909 (Herb. Bonaparte).

In size, shape and texture exceedingly like *P. fasciatum* (Bl.) but quite different by its ciliate scales, sparsely pubescent fronds and immersed sori.

**Polypodium Mjöbergii** C. Chr. sp. n. — *Phymatodes* rhizomate repente, paleis peltatis, pallidis, tenuibus, ovatis, breve acuminatis vel subobtusis, integris vestito. Stipite griseo-vel obscuro-viridi, ut toto folio glaberrimo (in specimine incompleto verisimiliter 10—20 cm longo). Foliis dimorphis. Lamina *folii sterilis* late ovata, 35 cm longa et lata, coriacea, laete viridi, ad alam 1 cm latam pinnatifida. Segmentis (praeter similem terminalem) 5-jugis, lanceolatis, acuminatis, 15—20 cm longis medio 3.5—4 cm latis, sinibus 1 cm latis rotundis separatis, marginibus incrassatis, inter venas principales serraturis parvis levissime serrulatis; rachi costisque infra prominentibus, nigrescentibus. Venis primariis ad marginem distinctis, 7—8 mm inter se remotis, sub angulo 50—55° excurrentibus, venulis dense reticulatis, occultis. — Lamina *folii fertilis* magnitudine sterili aequali, aut perfecte pinnata aut ad alam 2—3 mm latam pinnatifida, pinnis 5—7-jugis (raro unijugis vel folio integro), oppositis, 5 cm inter se remotis, ad 15 cm longis 1 cm latis, longe acuminatis, levissime serrulatis, basi utrinque aequaliter dilatatis, basi inferiori longius decurrentibus. Sori utrinque uniseriatis, globosis, ca. 4 mm diametro, non confluentibus, medialibus, leviter depressis, paraphysibus nullis.

Borneo: Sarawak, Mt. Murud, 5—6000 ft., E. MJÖBERG 1923, no. 6. (Type in Herb. C. Chr.).

Intermediate between *P. taeniatum* Sw. and *P. incurvatum* Bl., in size, habit and sori resembling the former but decidedly dimorphous, as the

latter, which is much thicker in texture with deeply immersed sori and usually with trilobed sterile fronds.

*Pteris digitata* (Bak.) C. Chr. sp. n. — *P. quadriaurita* var. *digitata* Baker, Journ. of Bot. 1879: 40. — *Eupteris* *P. Grevilleanae* Wall. proxima, multo majore, foliis conformibus, lamina in stipitem non decurrente. — Rhizomate breve, parce squamoso, stipite usque ad 50 cm longo (folii fertilis saepe multo longiore), atropurpureo, superne profunde sulcato, sulco lineis luteis marginato. Lamina quinquangulari, ad 20 cm longo 15 cm lato, basi in stipitem non decurrente, firmiter herbacea, glabra, utrinque striata. Pinnis lateralibus unijugis, oppositis, sessilibus, oblique erectis, ad 12 cm longis 4.5 cm medio latis, breve caudato-acuminatis, basi cuneatis, furcatis (pinnula II. ord. 8 cm longa), pinna centrali ad 20 cm longa 6—7 cm medio lata, basi usque ad pinnas laterales 2—3 cm cuneatim decurrente; costis inferne ad basin atropurpureis sursum stramineis, elevatis, superne spinis destitutis(?); pinnis ad alam 6—8 mm latam pinnatifidis, segmentis falcatis, ad 4 cm longis 9 mm latis, marginibus subparallelis integris, in apicem subacutum serratum cito angustatis, dentibus obtusis, 6—8; venis plerisque furcatis, parum distinctis, ca. 15-jugis e costulis et praeterea 3—4 furcatis e costa inter duas costulas egredientibus. Sori angustis, nec sinum nec apicem serratum attingentibus.

British North Borneo: Shady jungle, Lawas river, coll. BURBIDGE. (Type at Kew). Sarawak: Mt. Penrissen, common on rocks, BROOKS no. 14 (Brit. Mus. Nat. Hist.).

In general habit and striated surfaces like *P. Grevilleana* Wall. but much larger and differing from it in several characters. Some Bornean specimens leg. HOSE, referred to var. *digitata* by BAKER, belong to *P. Grevilleana*.

*Pteris kivuensis* C. Chr. sp. n. — *Eupteris* subtripartita rhizoma crasso (decumbente?), paleis castaneis, lineari-lanceolatis, longe acuminatis, integris dense vestito. Stipite ad 50 cm longo, ad basin brunneo, paleaceo et paleis delapsis asperulo, sursum ut rachi stramineo superne brunneo nitido, nudo, laevi glabroque. Lamina subtripartita, late deltoidea, 35 cm vel ultra longa, griseo-viridi, firmiter herbacea, glaberrima, basi bipinnata-pinnatifida, supra pinnas basales pinnata-pinnatifida. Pinnis basalibus oppositis, parte centrali laminae similibus sed minoribus, ca. 20 cm longis, petiolo 3 cm longo stipitatis, impari-pinnatis, pinnulis praeter terminalem 3-jugis, ca. 12 cm longis 2 cm latis (terminali paulo majore), caudato-acuminatis, basi subsessilibus, abrupte cuneatis, ad alam 1—1.5 mm latam pinnatifidis; pinnis sequentibus 3—4-jugis (terminali non visa), suboppositis, 7—5 cm inter se remotis, adscendentibus, pinnulis basalibus similibus, 15—18 cm longis, 3 cm latis; segmentis falcatis, basi postice decurrentibus 7 mm medio 5 mm latis, apice acutis, breve acute dentatis; costis stramineis, superne sulcatis, ad basin nervi mediani segmentorum spinam 0.5 mm longam ferentibus, inferne teretibus, elevatis; venis stramineis, 10—12-jugis, plerisque furcatis, duabus basalibus basiscopiis e costa egredientibus, simplicibus vel furcatis. Sori mediam



partem laterum segmentorum occupantibus, angustis, indusiis pallide brunneis, integris.

Tropical Africa: Congo Belge. Montagnes à l'ouest du Lac Kivu, in forest, 2000—2400 m, février—mars 1929, H. HUMBERT no. 7826. (Type in Herb. C. Chr.).

Like *P. scabra* Bory and *P. griseo-viridis* C. Chr. in many characters but quite different by the large basal pinnæ, which are again pinnate-pinnatifid but scarcely so developed as in the so-called tripartite species, further by the cuneate bases of the pinnæ.

*Tectaria modesta* C. Chr. sp. n. — Plate VI, fig. 1. — *Sagenia* rhizomate repente, 2—3 mm crasso, paleis brunneis, lanceolato-acuminatis sat dense vestito. Stipitibus 0.5—2 cm distantibus, 5—7 cm longis, gracilibus, stramineis, glabris, ad basin sparse paleaceis. Lamina simplici, lanceolata, 15—20 cm longa 1—1.5 cm lata, subcoriacea, glaberrima, marginibus leviter repandulis, apice acuta vel breviter acuminata, versus basin sensim angustata. Venis primariis 6—7 mm inter se remotis, curvatim adscendentibus, fere ad marginem productis, areolis 4—6-seriatis, venulas liberas saepe includentibus. Soris (in speciminibus paucis) irregulariter dispersis, compitalibus, parvis, indusiis reniformibus, persistentibus, coriaceis, glabris.

Borneo: Sarawak, Kuching, April 21st, 1914, Native collector of Sarawak Museum no. 218. (Type in Herb. C. Chr.).

I do not know any species of *Tectaria* resembling this; its entire, narrow, lanceolate fronds resemble *Diplazium lanceum* or in shape and size a single pinna of *Tectaria semibipinnata*, but it is not probable that it is a juvenile, fertile state of that species.

*Tectaria repens* C. Chr. sp. n. — Rhizomate late repente, 2 mm crasso, paleis brunneis ovato-lanceolatis acuminatis integris subimbricatis dense vestito. Foliis ca. 4 cm inter se remotis, stipite ad pinnas infimas 7—8 cm longo, parte superiore dimidia lamina decurrente alato, paleis brunneis parvis vestito. Lamina ambitu deltoidea 12—15 cm longa et fere lata, obscure viridi, firmiter herbacea, ad rachin alatam (ala utrinque 2 mm lata) pinnatifida; pinnis vel segmentis lateralibus 4—6-jugis, suboppositis vel alternis, 2—3 cm inter se remotis, adscendentibus, linearibus, usque ad 10 cm longis (plerisque brevioribus) 3—4 mm latis, integerrimis, acuminatis, basi ala confluentibus, basalibus saepe 1—3 lacinias lineares remotas, 3—4 cm × 1—2 mm, basiscopicas et interdum 1—2 acroscopicas ferentibus, pinna terminali simillima sed latiore, 6—7 mm; lamina superne glaberrima, subtus ad rachin costasque densissime ad venas parenchyma sparse pilis articulatis brunneis tomentosa, rachi costisque praeterea paleis parvis sparse vestitis. Venis parum distinctis (primariis perbrevibus), 1—3 series areolarum hinc inde venulam liberam includentium formantibus. Soris (in speciminibus perpaucis) dorsalibus, uniseriatis? parvis, exindusiatis?

Borneo: Sarawak, Upper water of the Rejang River, CHARLES HOSE, July 1904. (Type at Kew).

A very remarkable fern, which Bishop HOSE believed to be a new

species of *Sagenia*, while BAKER compared it with *Polypodium pentaphyllum* Bak. It resembles certainly that species in general habit but it is no *Polypodium* at all. I have been inclined to consider it an abnormal form of *Bolbitis* (*Campium* Cop.), but the distinctly round sori, dorsal on the veins, place the species in *Tectaria*, still quite unique in this genus by the long trailing and thin rhizome; on the other side the dense brown tomentum of the ribs beneath consisting in "Otenitis-hairs" is of the same kind often found in species of *Tectaria* but never of *Bolbitis*. *Nephrodium Hosei* Bak. Journ. Linn. Soc. 22 pl. 11, which is a small form of *Tectaria Lobbii*, is as to shape of frond and pinnæ exceedingly like *T. repens*, but the leaves are tufted on an erect rhizome, glabrous and fully pinnate. Mr. HOSE was unable to find good fertile fronds, and the soral characters, indusiate or not, number and position, are therefore rather uncertain.

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PLATES

# PLATE I.

All figures drawn after the type-specimens in Herb. Cavanilles.

- Fig. 1—3. *Acrostichum squamosum* Cav. (Pag. 9).  
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- 4. *Polypodium enerve* Cav. Nat. size. (Pag. 12).
- 5—9. *Tectaria falcata* Cav. (Pag. 15).  
5—6. Sterile and fertile pinnæ from the same frond, nat. size.  
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- 10—11. *Tectaria serrata* Cav. (Pag. 16).  
10. Pinna, nat. size.  
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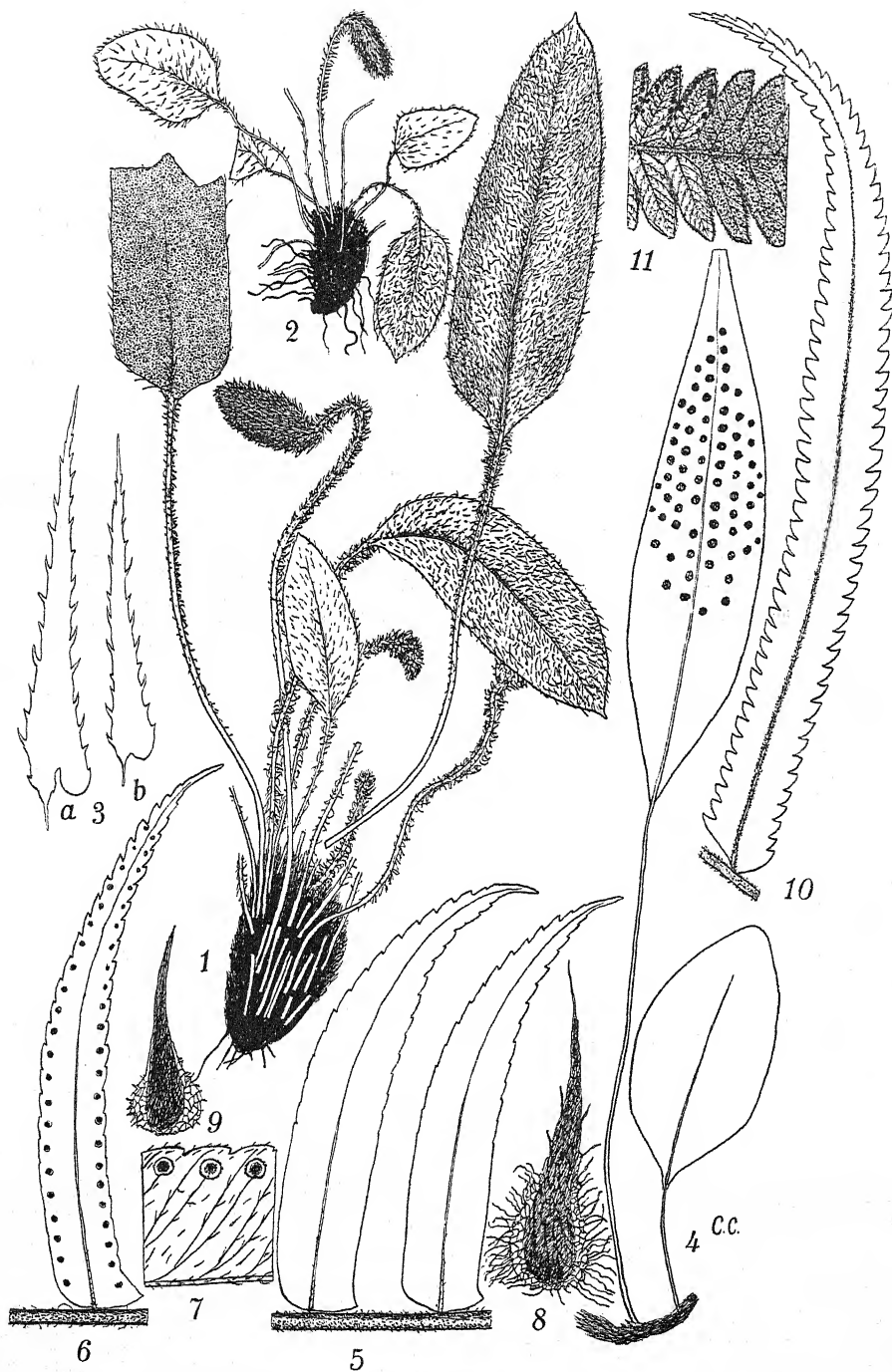




PLATE II.

All figures drawn after the type-specimens in Herb. Cavanilles.

Fig. 1—3. *Acrostichum plicatum* Cav. (Pag. 9).

1. A whole plant and detached flat sterile and folded fertile leaf.  
Nat. size.
2. Scale from rhizome,  $\times 3,5$ .
3. Scales from the under side,  $\times 3,5$ .

4—5. *Acrostichum caudatum* Cav. (Pag. 10).

4. Basal pinna, nat. size.
5. Secondary pinnule,  $\times 2$ .



PLATE III.

All figures drawn after the type-specimens in Herb. Cavanilles.

Fig. 1—4. *Oleandra neriformis* Cav. (Pag. 17).

1—2. Portions of sterile and fertile fronds, nat. size.

3. Fragment,  $\times 2$ .

4. Scales from stem,  $\times 10$ .

- 5—6. *Asplenium vittaeforme* Cav. (Pag. 18).

5. Leaf,  $\times 0.5$ .

6. Fragment, nat. size.

- 7—8. *Clementea palmiformis* Cav. (Pag. 30).

Pinnules, nat. size, and fragment,  $\times 2$ .

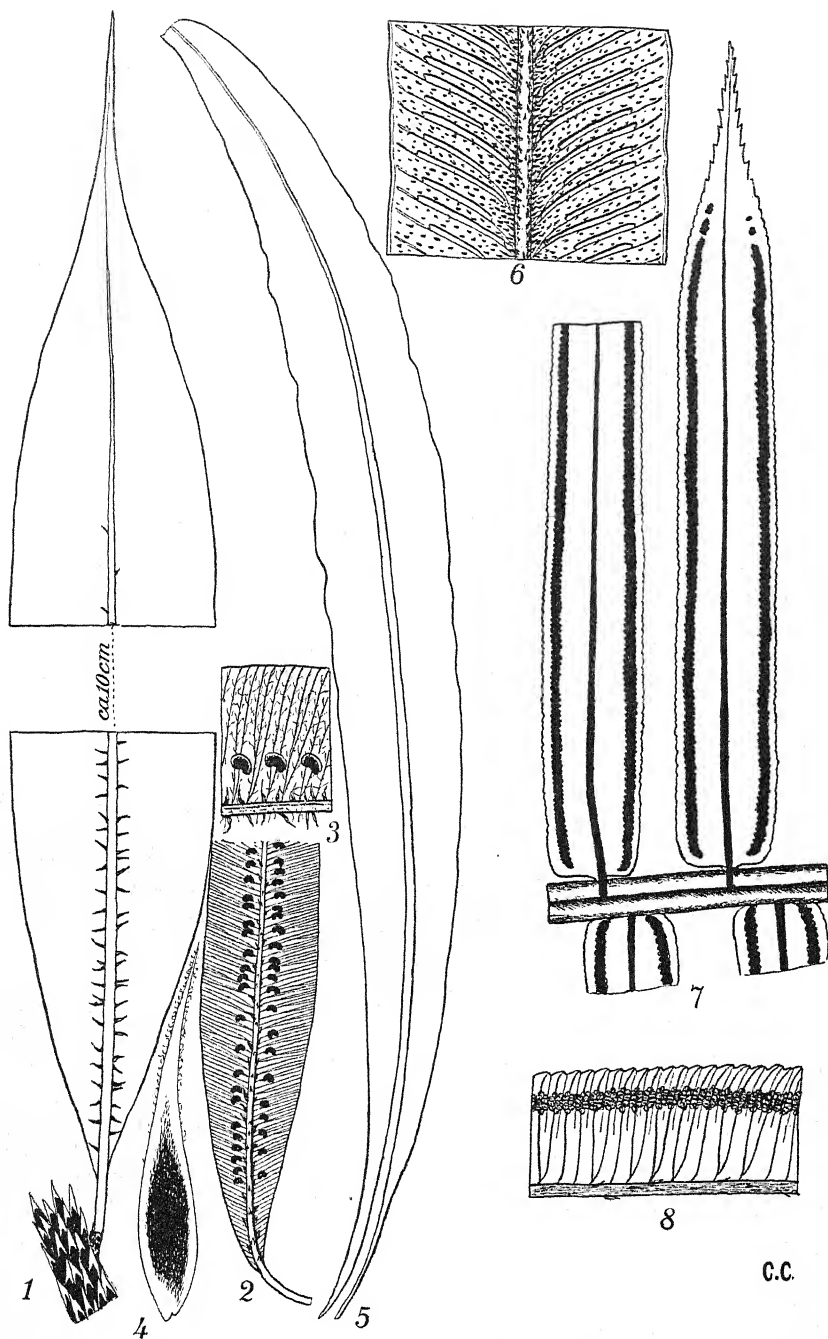


PLATE IV.

*Blechnum levigatum* Cav. (Pag. 20).

The whole type-specimen, nat. size, and fragment,  $\times 3$ .



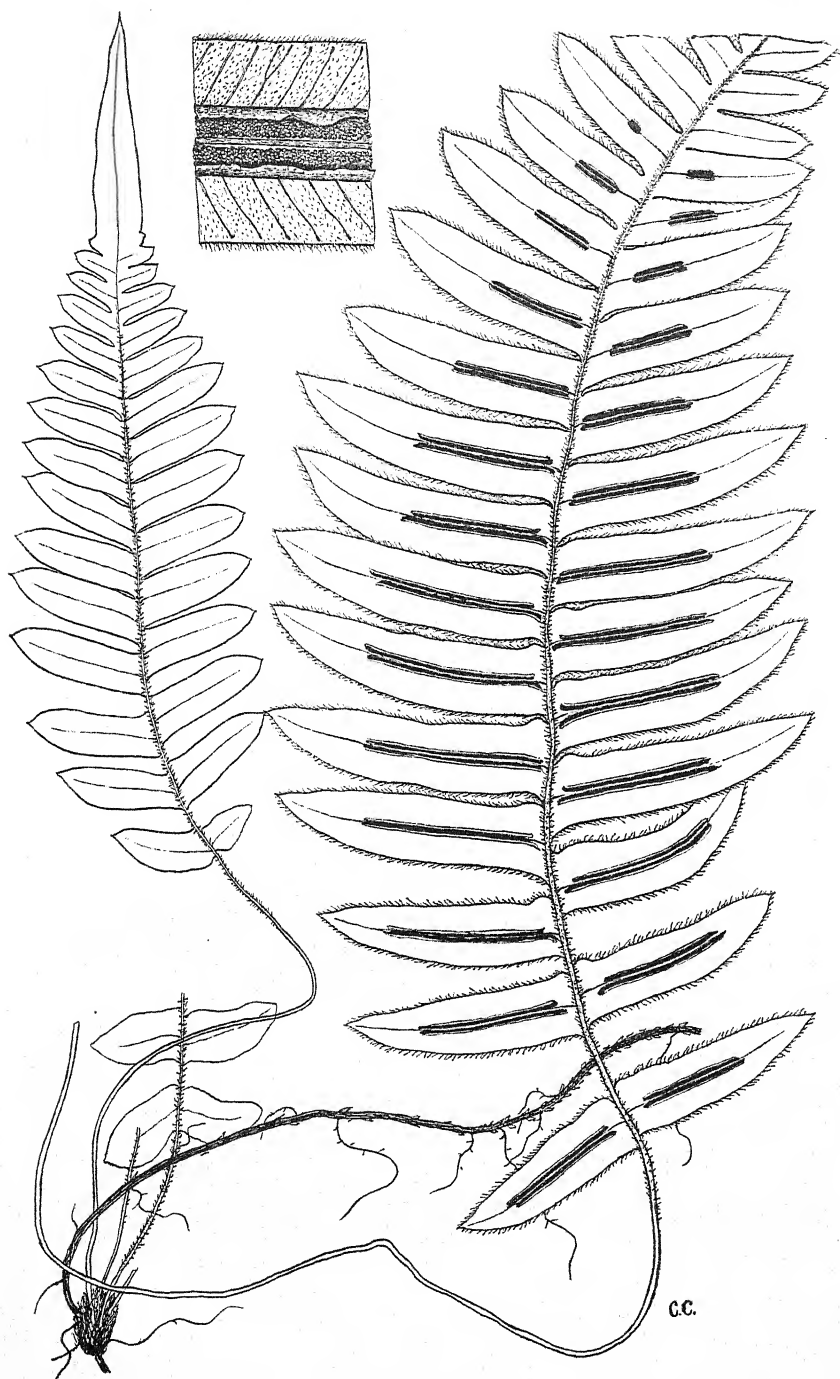


PLATE V.

Fig. 1— 4. *Dryopteris(?) phaeostigma* (Ces.) C. Chr. (Pag. 47).

1. Pinna of the type, nat. size.

2. Segments,  $\times 2$ .

3. Indusium.

4. Scale from stipe-base.

- 5. *Dryopteris imponens* (Ces.) C. Chr. (Pag. 50).

Fragment of a pinna from the type, nat. size.

- 6. *Dryopteris tuberculata* (Ces.) C. Chr. (Pag. 48).

Fragment of a rather narrow pinna from the type, nat. size.

- 7—10. *Dryopteris Endertii* C. Chr. sp. n. (Pag. 60).

7. Pinna of the type,  $\times 0.5$ .

8. Pinnules, nat. size.

9—10. Fragments showing venation and sori of the lower lobed  
and the upper subentire portion of a pinnule,  $\times 2$ .

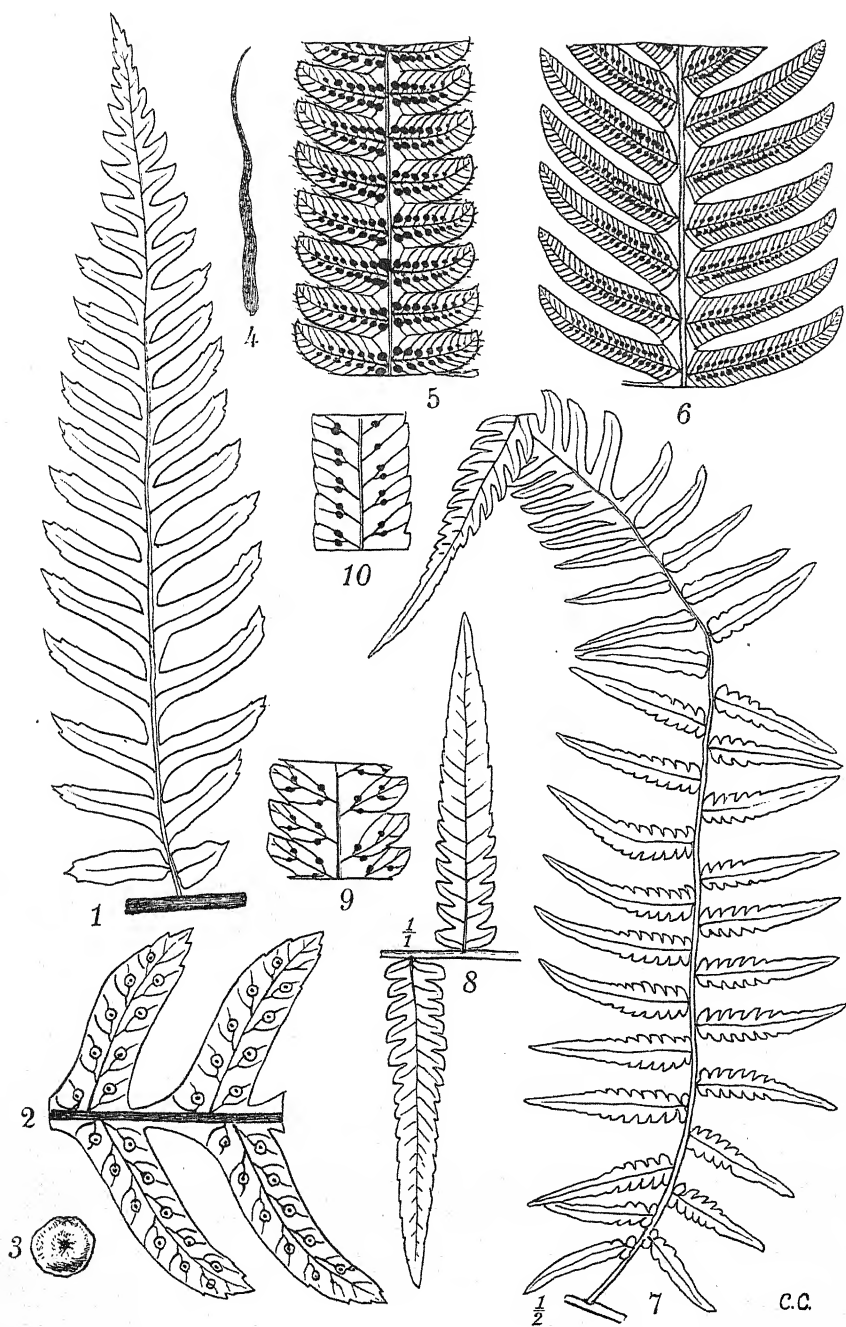


PLATE VI.

- Fig. 1. *Tectaria modesta* C. Chr. sp. n. Nat. size. (Pag. 72).  
- 2. *Cyclophorus Dielsii* C. Chr. sp. n. Nat. size (Pag. 60).  
- 3—4. *Dryopteris cyclopeltidiformis* C. Chr. sp. n. (Pag. 59). Pinna, nat. size, and fragment,  $\times 2$ .  
- 5—6. *Dryopteris Handeliana* C. Chr. sp. n. (Pag. 62). Pinnæ, nat. size, and fragment,  $\times 2$ .  
- 7—9. *Athyrium Humbertii* C. Chr. sp. n. (Pag. 54).  
7. Secondary pinnule of a lower pinna, nat. size.  
8. Tertiary pinnule,  $\times 2$ .  
9. Indusia, closed and ruptured.

